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MARCH 2001

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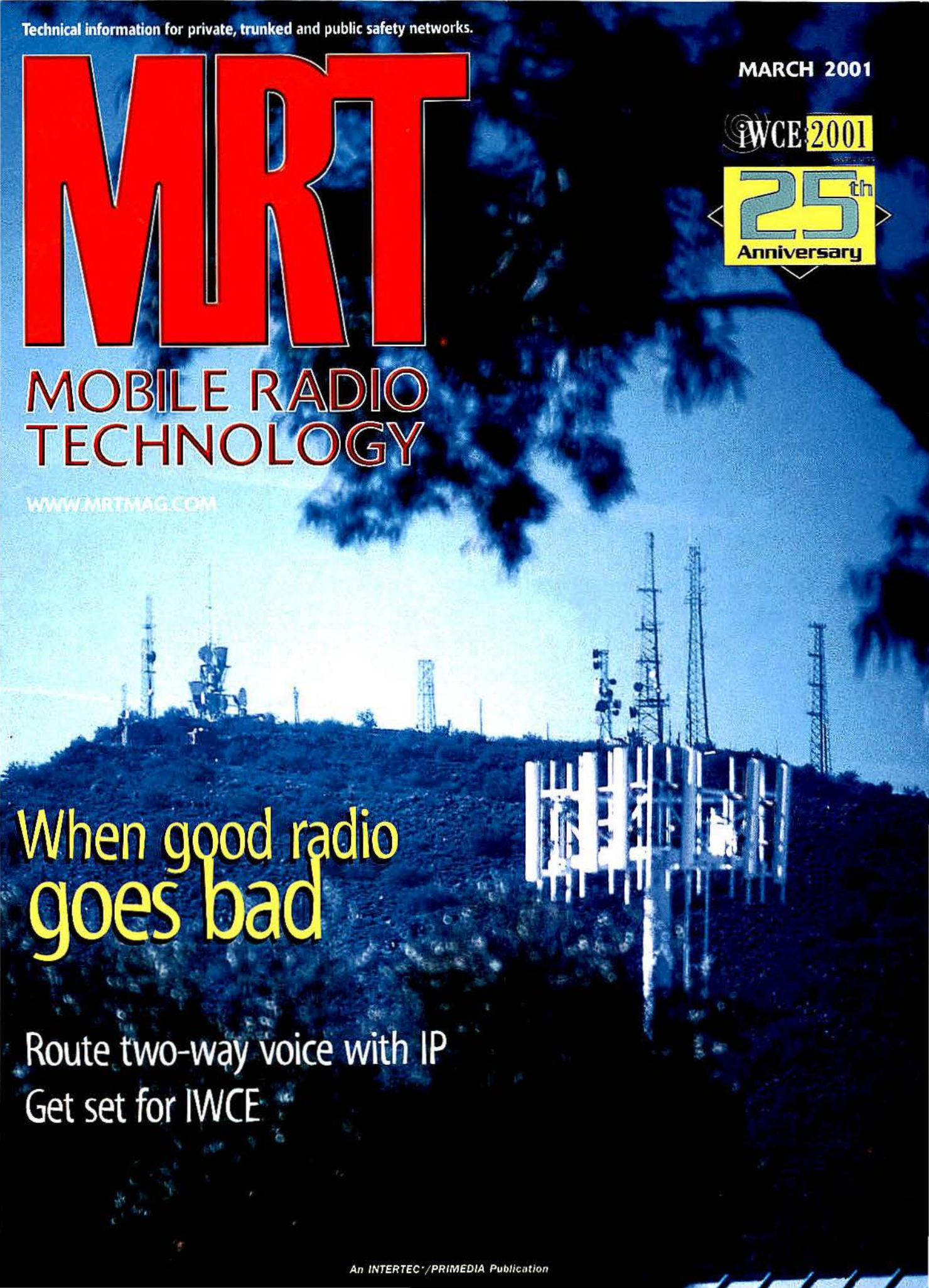

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On the cover: Interference to public safety radio in Phoenix serves as an example of how wireless system base stations could ruin the 700MHz band. Story on page 20.

MRT
MOBILE RADIO TECHNOLOGY

March 2001
Volume 19, Issue 3

Don't get snowed in without a good radio system. See page 70.

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*Don Bishop*
Interference from commercial mobile radio systems causes coverage gaps in public safety radio communications systems. Payment will be made—in dollars or lives.

**28** **Seeking restitution for damages from harmful interference**
*Richard Hanno*
OK. You've *tried* being a 'good RF neighbor.' You've *tried* protecting your system. You've *tried* being patient. Now it may be time to sue the 'offenders.'

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The International Wireless Communications Expo celebrates its 25th anniversary this year.

**70** **Wireless @ Work: Small business, snow business**
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Ski resorts require quick and effective on-site mobile radio communications to ensure the safety and satisfaction of their guests. Radio needs range from summoning the bell staff to coordinating...*explosives*?

Voice over IP is taking voice comms through the Internet. See page 40.

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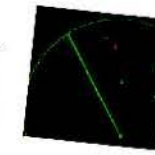
Despite the FCC's greater emphasis on enforcement, the Feds still ignore some areas.



## WWW.MRTMAG.COM - highlights

**Under the radar**
*By Robert H. Schwaninger Jr.*
Illegal devices the FCC ignores.

**Power passes to 'the other' Powell**
Commissioner Michael K. Powell has been designated FCC chairman.

**Kennard steps down as FCC Chairman**
Chairman William E. Kennard announces his resignation, effective Jan. 19, 2001.

**Clinton extends Ness' FCC term**
With Congress in adjournment, President Bill Clinton reappointed Democrat Susan Ness to the FCC on Dec. 18.

Also see the full story regarding changes at the FCC in this month's "Tuning In" on page 74.

**Industry media**
CICS launches new Web site.

**Industry people**
Donald J. Vasek joins the Industrial Telecommunications Association.

**Reader letters**
Smoking doesn't belong in *MRT*.

**Calendar of events**
Pack your suitcase for mobile radio trade shows.

**How to get an article in *MRT***
Be an author—guidelines for submitting articles.

**Marketing services**
Marketing contacts and advertising opportunities.

**Industry links**
Links to industry association Web sites.

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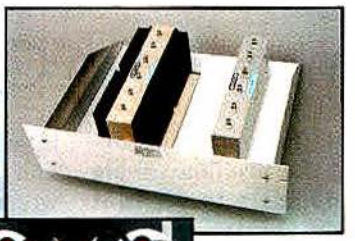

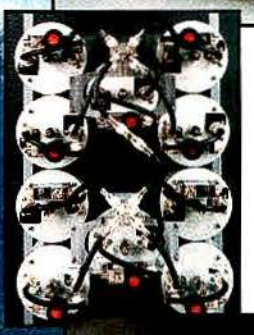

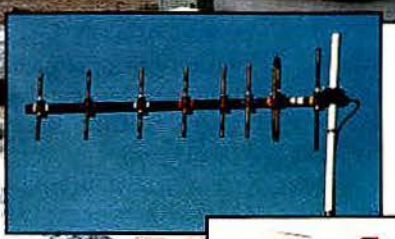

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# Public safety takes its case to the new FCC chairman and to Congress

We congratulate Michael Powell on moving up to the chairmanship of the FCC. The position is a lightning rod for every issue that has to do with telecommunications—and a few that don't. Mr. Powell will be hearing from thousands of people like you who will be pleading their various cases.

Perhaps the most pressing regulatory issue for you has to do with present and future interference to public safety radio communications systems.

Present interference mostly involves signals from Nextel base station antennas that block 800MHz voice and data communications for police and fire departments in locations near the base stations.

Future interference involves signals from yet-to-be-built wireless base station antennas and the much-anticipated public safety radio systems, both on 700MHz frequencies. It's certain that similar interference will result if the 700MHz wireless systems are built according to current regulations and auction terms.

**The word is that many members of the FCC staff remain convinced that the problem is big enough at 800MHz to warrant changes in regulation of that band.**

More information on this matter appears on pages 20 and 96.

If you respond to the request that Phoenix police Chief Harold Hurtt makes in his letter on page 96, then Mr. Powell will be hearing from you soon. Whether Mr. Powell will be impressed if he receives a lot of correspondence from the two-way radio community is difficult to predict. If he doesn't hear about the problem from you, though, he may not hear about it from his staff.

### FCC? Unconvinced

The word is that many members of the FCC staff remain to be convinced that the problem is big enough at 800MHz to warrant changes in the regulation of that frequency band. Many FCC staff members are moved even less by evidence that public safety agency use of the 700MHz band will be dramatically curtailed by commercial wireless base stations.

The FCC is an independent regulatory agency, and its independence hardly shows more clearly than when it thumbs its nose at its creator and sometimes overseer, Congress. Congress has made efforts many times and in many ways to tell the FCC to make spectrum available for public safety communications and to protect it from interference.

### Congress? Help wanted

Whether Congress will come to the aid of public safety agencies in this matter depends on how effectively the enormity of the problem can be communicated. The subject of public safety radio communications gets brief flurries of attention following acts of terror, natural disasters and accidents on the scale of airliner crashes and passenger train derailments. The attention quickly fades.

How the current and pending interference problems at 800MHz and 700MHz are resolved today will underpin tomorrow's public safety communications capability to handle its mission.

How is it going with Congress so far?

Mr. Hurtt and officers from the Phoenix police and fire unions met with Sen. John McCain (R-Ariz.) at his Phoenix office on Jan. 17. Mr. McCain chairs the Senate Commerce Committee, which oversees the FCC.

Although the senator had been briefed about the interference problem, the issue was, in his view, only a difference of opinion between Motorola and the FCC.

The delegation visiting the senator explained that the FCC frequently disregards its engineering staff's opinions in favor of those of its economists.

One delegate said that the senator reviewed the data that the delegation presented, challenged the arguments for soundness, and then agreed to take them further in Washington.

The position of the delegation visiting the senator is that the FCC must accept expert opinion, either from its own Office of Engineering Technology or from trusted industry sources. To deny the noise contributions of new digital modulation technologies is to deny that problems exist in 800MHz.

The regulations and auction terms for the 700MHz band must be revised to prevent a further, unnecessary increase of the noise floor in this new public safety spectrum.

Don Bishop

**Editorial Director**
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# Fortunate son

The new chairman of the FCC has earned some respect. Some were dismissive of Michael K. Powell's appointment as an FCC commissioner. Despite his service as chief of staff of the DOJ's Antitrust Division, common criticisms of the nomination were "little communications experience," "obligatory minority appointment," and "connected family." Improbably, these points became advantages.

Powell-the-lawyer views the FCC as a regulatory agency with tasks assigned by Congress, rather than as an agent for social change (novel concept). His ethnicity makes him sensitive to needs of designated entities, but also gives him cachet to criticize entitlements that undermine existing small businesses. Powell the former cavalry officer, and scion of a respected leader, curiously values straight talk and public duty.

The principles Powell has articulated over three years bode well for our industry—*if* it speaks the same language back to him.

In public statements and commission votes, he has been a skeptic of market and technological rhetoric, or, as he puts it, "techno-euphoria." He thinks regulators should avoid picking technology winners and second-guessing consumers.

A free-market advocate, Powell argues that policymakers should avoid 'big guy myopia' and not lose sight of smaller telecommunications companies. He likes quick and decisive regulatory decisions. Powell opposes the FCC's generating rules without specific authority. He has a jaundiced view of intervention, noting that "When a regulatory agency has to make up its own acronym to describe a product or service it intends to regulate, one should be concerned."

When land mobile issues are brought before the new commission, Powell's standards and attitudes can be expected to apply to our segment as well.

Powell's designation as chairman shows an absence of a Bush administration "telecom agenda." Otherwise, the new president would have installed his own advocate. This is good. Powell publicly criticized FCC politicization during the Kennard years. He understands what the term "*independent* regulatory agency" means.

He can also be funny and diffident about the commission. Anyone who makes references to Dr. Seuss, Monty Python and Frankenstein's monster in his statements, dissents and speeches is not likely to promote himself as the Delphi oracle of telecom, as past chairmen have.

Now, none of this indicates that *our* industry segment's interests concern the new chairman. However, when our issues are brought before the new commission, his standards and attitudes regarding other bureaus can be expected to apply to our segment as well.

Land mobile's challenge will be avoiding the chairman's aversion to special interests and protectionism for outdated technologies. It will have to consistently advance evidence, not emotionalism, that the systems it employs and the services that it offers have not been eclipsed by better technologies. Land mobile services must exhibit innovation and demonstrate that they *are* competitive and can still serve the best public interests of the telecommunications consumer, industrial production and public safety.

If Powell *hears* that, land mobile will have friends in high places. ■

David A. Keckler

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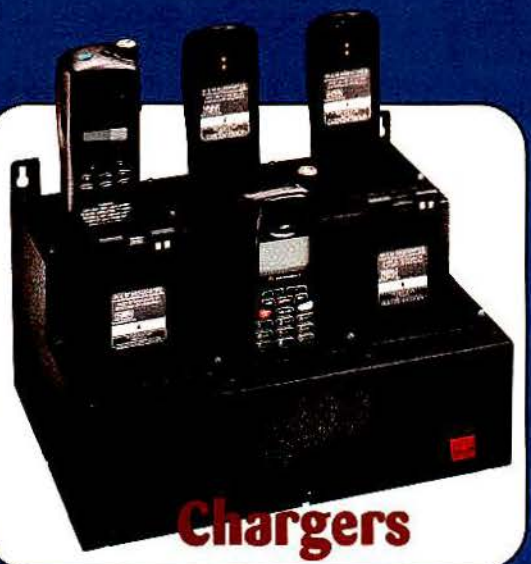

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# Steering toward the future

By Robert H. Schwaninger Jr.

With the news that Commissioner Michael K. Powell will become the new chairman—and thus the new leader—of the FCC, there will likely be some rejoicing throughout the industry. My take on the political climate of my clients is that the wind had turned quite chilly for the Kennard agenda and that the new Republican chairman would receive a warmer welcome.

But despite any attempt at a honeymoon period, I am reserving my opinion and supplying guarded hope for the future. My years of careful jading in Washington lead me to an increasingly irritated view that the problems confronting our industry are not based in politics, i.e., (D) or (R). Rather, they lie in the conflict between spectrum management vs. industrial/economic policy wonking.

Illustration by John Hayes

"...WELL, FIRST OFF, LET'S SEE ABOUT DEFINING YOUR JOB."

The past two chairmen had similar agendas that emphasized industrial/economic policy, including a reduction in the relevancy of the antitrust laws as they might be applied to the telecommunications industry. Therefore, we witnessed an easing of spectrum caps, license-assignment requirements and build-out requirements. There were numerous indicators that the agency was more concerned with commodity exchange of spectrum than delivery of services to the public.

In fairness, Chairman Powell did join—albeit sometimes reluctantly—in some of the past decisions to auction blocks of spectrum without providing for sufficient opportunity to simultaneously foster actual competition in the market. Yet, his dissents and speeches reflect a man who is wrestling with the issue of inclusion as it relates to his devotion to free-market ideals.

I sympathize.

Over the years I have also had difficulty reconciling the inclusion of a wider and more diverse universe of competitors with a desire to remove unnecessary regulatory restrictions. It is a complex problem that is further exacerbated by the government's apparent dependency on auction revenues, or at least by its reluctance to seriously examine alternatives, technical and otherwise, to this method of spectrum distribution.

Diversity in ownership is certainly not served by FCC auctions that reward only a handful of the wealthiest companies. Nor is it served by rules that focus only on urban markets while ignoring or minimizing the delivery of services throughout an entire region. Nor will disaggregation or partitioning serve to increase competition, unless such methods exclude *ad valorem* tribute paid to auction participants who seek a favorable return on investment for use of

Schwaninger, *MRT's* regulatory consultant, is the principal in the law firm of Schwaninger & Associates, Washington, which is counsel to Small Business in Telecommunications. Schwaninger is also a member of the Radio Club of America.

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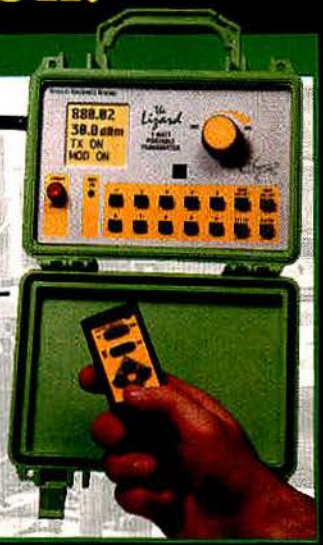


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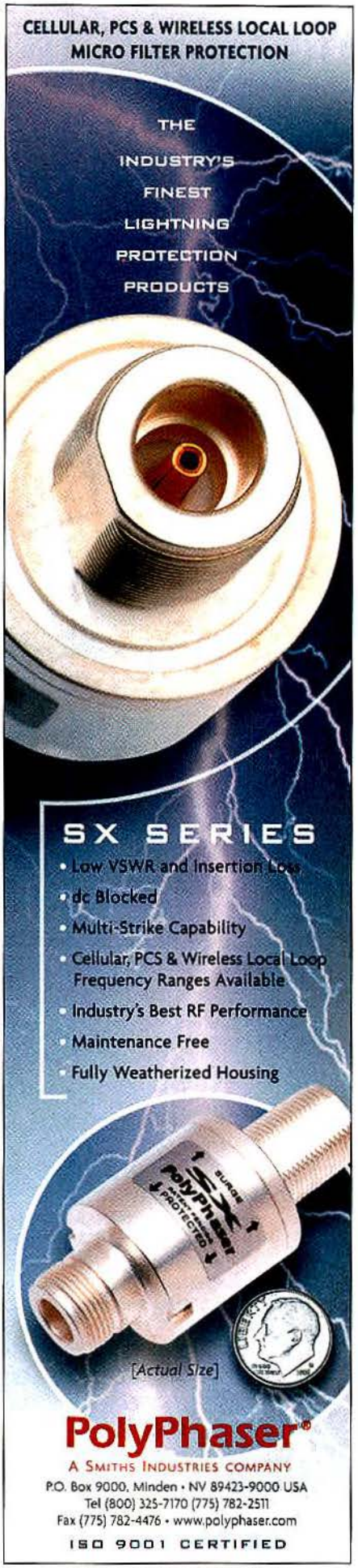

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"their" spectrum.

So, what can be done to promote a competitive marketplace that delivers services to the entire market? That is the $64,000 question with which the agency and Chairman Powell must now wrestle.

At present, the regulatory regime favors institutional structures for the purpose of delivery of services. Well-funded, publicly traded companies are responding to congressional edicts that have sought to streamline the functions of the agency to eliminate administrative responsibilities, while increasing visibility of purpose. Stated plainly, political headline-dandies are trying to get the FCC to act as though no problems are so complex that they cannot be handled by a one-page statement that says either, "We have let the market decide via auction receipts in the billions of dollars" or "The FCC will defer judgment on that matter to Congress and the Justice Department."

The fact is, the FCC has a job to do and should be allowed to do it. The question is: What is that job? I believe the job should focus on issues of spectrum management and use to assure delivery of services to the public from a diverse and numerous universe of competitors that are encouraged by reducing direct or indirect barriers to market entry. Further, licensees should be allowed to succeed or fail based on performance and logical growth, rather than solely on those contributions to the U.S. Treasury that have begun to resemble insurance premiums against enforcement of the FCC rules.

For example: Will Chairman Powell recognize that there are wide and numerous rural areas that are unserved by the promises of the wireless revolution? Will he understand that these underserved areas will not receive the benefit of "3G" or "2G"or *any* "G" until auction winners have wrung every last dime out of urban consumers? Will he recognize that there is no incentive for one publicly traded company to accept from another, by disaggregation or partitioning, the responsibility to serve those rural customers? Finally, will he conclude that only by making spectrum resources available to local operators—who will exploit the service possibilities on a community-based level—will there exist any hope of implementation of new wireless services to rural communities, poor neighborhoods and other disenfranchised entities?

It is not enough to lean exclusively on the Universal Service Fund to provide incentives for delivery of service to rural areas. This method of delivery does not foster a competitive marketplace. Instead, it fosters growth by government hand-out and entitlement. It creates a system whereby the cost of gaining huge profits in urban areas is the introduction of a line item on urban consumers' bills.

What is needed is a balanced approach that fosters true competition by providing those entities that will enter and serve the entire market with a necessary portion of radio spectrum to do the job—even if that means sacrificing auction dollars during a period of budget surplus. This solution will require courage, but I remain optimistic that the apple doesn't fall far from the tree, and Chairman Powell will demonstrate that courage. ■

## The event most likely to happen in 2001

Poll results from the January "In the Public Interest" column:

| | |
|---|---|
| 25% | Additional spectrum below 1,000MHz will be released by the federal government for use by private industry. |
| 50% | The FCC will adopt rules creating "band managers" for all of the shared VHF and UHF private radio spectrum. |
| 25% | The FCC's Universal License System will crash, leaving the public without access for as long as two weeks. |

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# Technology is converging rapidly

## So move fast to avoid the train wreck

By David O. Dunford

I really enjoy looking at old pictures of early police communications centers. Those were *real* radios complete with killer high voltage, huge knobs and complicated manual tuning.

Almost certainly, the adoption of this "new" technology created job security for early dispatchers who needed to be engineers as well as call takers. Our 21st-century communications centers hold a similar promise but with a modern twist.

As every tool at the dispatcher's disposal becomes "digital," there is an increasing (perceived) need for "data convergence." The basic aim of this discipline is to present to the dispatcher all information and communications functions in a practical arrangement on a single graphical user interface or computer screen.

**Circumstances may dictate that center managers aren't permitted to involve local support until well after the out-of-towners have left with the local loot and the software maintenance agreement is ready to expire.**

When the screen is fully populated, this fancy display looks more like a full-motion arcade game in action.

Personally, when the system crashes, I'd prefer a simple TILT instead of the common "orange screw" or "blue screen of death."

On the police side of operations, many departments have already adopted variants of several digital disciplines that would really benefit from "convergence."

This is because each vendor has historically furnished a complete, separate set of computer and terminal equipment. Extending this philosophy to a logical end would make the comm center look like a surveillance monitoring center at a large grocery store—but without the charm and glitter.

In-house computer systems for basic administrative information and "homemade" warrant files evolved first. Then came computer-aided dispatch systems and, most recently, mobile data terminals and even imaging (which we used to call "pictures").

Add basic Internet access with email to this digital mix, and each dispatcher would need six display screens.

Even the traditional functions of a comm center—namely telephone and radio voice communications—are now expected to have a "digital" presentation.

Several dispatch-console makers tout a phone system integrated with touch-screen radio system control, and at least one has provisions for CAD data integration that can even include images.

In an effort to get a user's perspective of this data revolution, I recently took an informal poll of Lenexa's three-person evening shift dispatch crew. (The lure of fresh Toll House cookies from dispatcher Debby "Eddie Munster" Bound also was an enticement for me.) All three dispatchers offered three similar observations:

- ❑ Buttons and lights "seem" more reliable to them than anything computer-based.
- ❑ The spatial placement and tactile feel of buttons and lights are preferred over any computer display.
- ❑ They want to be able to call the radio shop when *any* of the equipment acts up or fails—even the computer equipment traditionally supported by I.T. folks.

Dunford, MRT's public safety consultant, is technical services consultant for the Lenexa, KS, police department. He is a member of the Association of Public-Safety Communications Officials-International. [You can email Dunford at mrt@intertec.com]

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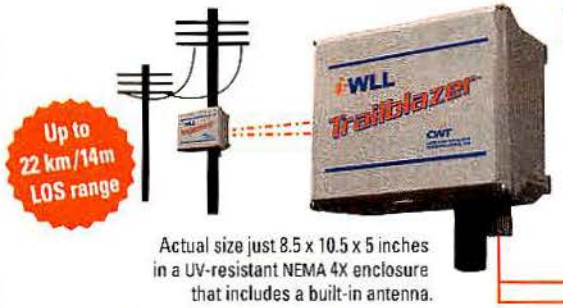


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Because the fundamental functions of a communications center (at least formerly) were configured, set up, and maintained by local shops and Radioman, it seems natural that center managers would turn, at least initially, to this resource for support with "convergence."

Sadly, circumstances (such as sales conditions and procurement processes) may dictate that center managers aren't permitted to involve local support until well after the out-of-towners have left with the local loot and the software maintenance agreement is ready to expire.

It's a certain fact of life that this convergence of presentation is an approaching feature of the future. Public safety agencies, as well as communications centers, are constantly being lobbied by sales folk, service providers and well-meaning consumers to "link up" and receive a swelling stream of data concerning every imaginable facet of emergency operations.

As I've discussed before, communications is the key. If the shop is responsible for the fancy CRT consoles, your staff should already be working on a plan for "convergence."

Have you spoken with your center manager lately? More importantly, has your technical staff visited with software and system providers at any of the product shows or public safety conferences? ■

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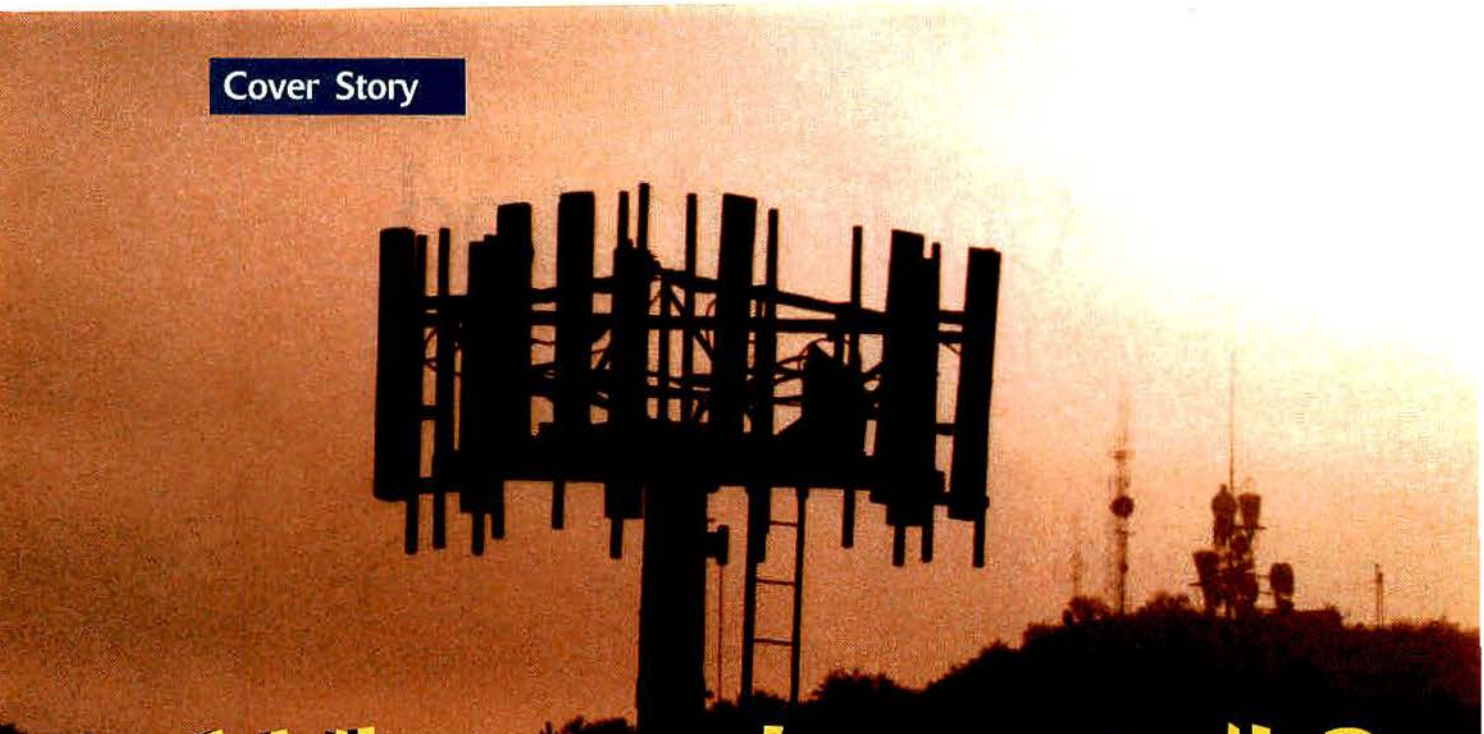


# Why can't we talk?

Interference from wireless telephone base station antennas causes coverage gaps in public safety communications. The FCC has the power to prevent the interference. If the FCC fails to act, the cost may be reflected in needless injuries, property loss and even the loss of life.

**By Don Bishop**

See the towers on the ridge in the distance? Notice the silhouette of the short wireless tower in the foreground?

To cover a large area, public safety radio communications systems use a limited number of base station antennas placed in locations with commanding views, such as tall towers, skyscrapers and ridges. Wireless telephone systems use base station antennas placed on short towers, rooftops and other locations with limited views, and they use a great number of them to cover a large area.

Therein lies a conflict.

Public safety radios used at a distance from their base station antennas have to be sensitive enough to pick up comparatively weak signals and selective enough to reject interference on nearby frequencies. As selective as some of these radios may be, they cannot reject unwanted signals that come in directly on public safety frequencies.

Some wireless base station antennas emit radio signals directly on these public safety frequencies. Even though the signals may be small, when the public safety radios are used in close proximity to the wireless base station antennas and at a distance from their own base station antennas, the wireless signals block reception on the public safety radios.

The Phoenix Police Department is among those affected by interference from wireless base stations. The department's mobile data terminals sometimes don't work when they are close to wireless base station antennas.

Key problem areas include street intersections where officers often aid victims of vehicle collisions and where wireless carriers commonly place base station antennas to serve the driving public.

"When the mobile data terminals don't work, the officers drive on, and when they can, they

Bishop is editorial director.

# It's the *interference*

retry," said Melvin G. Weimeister, police telecommunications superintendent for the department's Computer Services Bureau. "The way we determine that they're not working is by driving through an intersection and sending a message. If the terminals don't receive an acknowledgement after making three tries automatically, it lets you know."

### Priority radio calls

The mobile data terminals carry the department's "Priority Two" information about crime and accident victims and "Priority Three" information about crime history. The city's antiquated voice radio system handles "Priority One" calls about crimes in progress.

"We'll voice other calls, too, when it's necessary to make other officers aware," Weimeister said. "We make unit-specific calls on the mobile data terminals."

The Phoenix voice radio system is unaffected by interference of the same kind because it uses a different frequency that is widely separated from those used by wireless base stations. In the face of the city's growth, the voice system has enough additional problems and limitations to require replacement.

But the department can't risk moving it to frequencies that might be plagued with wireless base station interference, even though other frequencies would allow an enormous expansion of capacity and features.

Many public safety agencies, including the Phoenix police department, have their eyes on frequencies in the ranges of 764MHz–776MHz and 794MHz–806MHz.

That plan fit fairly well with the federal government's plans to assign nearby frequencies for more wireless services, as long as the wireless services would use the frequencies below 764MHz for transmitting and the frequencies below 794MHz for receiving. That's an oversimplification. But basically, it's a workable plan because it separates the wireless base station transmitting frequencies from the public safety base station receiving frequencies widely enough to allow the use of relatively inexpensive technology to control interference with a high expectation of success.

In a nasty turn of events for public safety agencies, the government changed its assignment plan for wireless services in a way that allows base station transmitters to use frequencies near those planned for receiving public safety radio signals. Public safety communications has been left with nowhere to run and nowhere to hide when it comes to avoiding wireless system

interference in the new 700MHz band.

A solution does exist.

If wireless system base station transmitters were regulated to reduce the strength of signals they emit on the public safety radio frequencies to a sufficiently low level, they wouldn't interfere. What's required?

Under the current FCC requirement, public safety mobiles and portables used as close as 350 feet from a wireless base station antenna could lose communications with the public safety system as much as 30% of the time.

▶ First is a requirement to limit wireless base station interference in the 794MHz–806MHz frequency range where public safety base station receivers will operate.

Motorola has suggested that the wireless base-to-base interference should be limited to a level of –80dBm in a 6.25kHz channel. If so, the wireless base station antenna could be placed as close as 250 feet to the public safety base station, and it would only reduce the reception coverage of the public safety base station by 5%.

▶ Second is a requirement to limit wireless base station interference in the 764MHz–776MHz frequency range where public safety mobiles and portables will operate.

**Base-to-mobile**

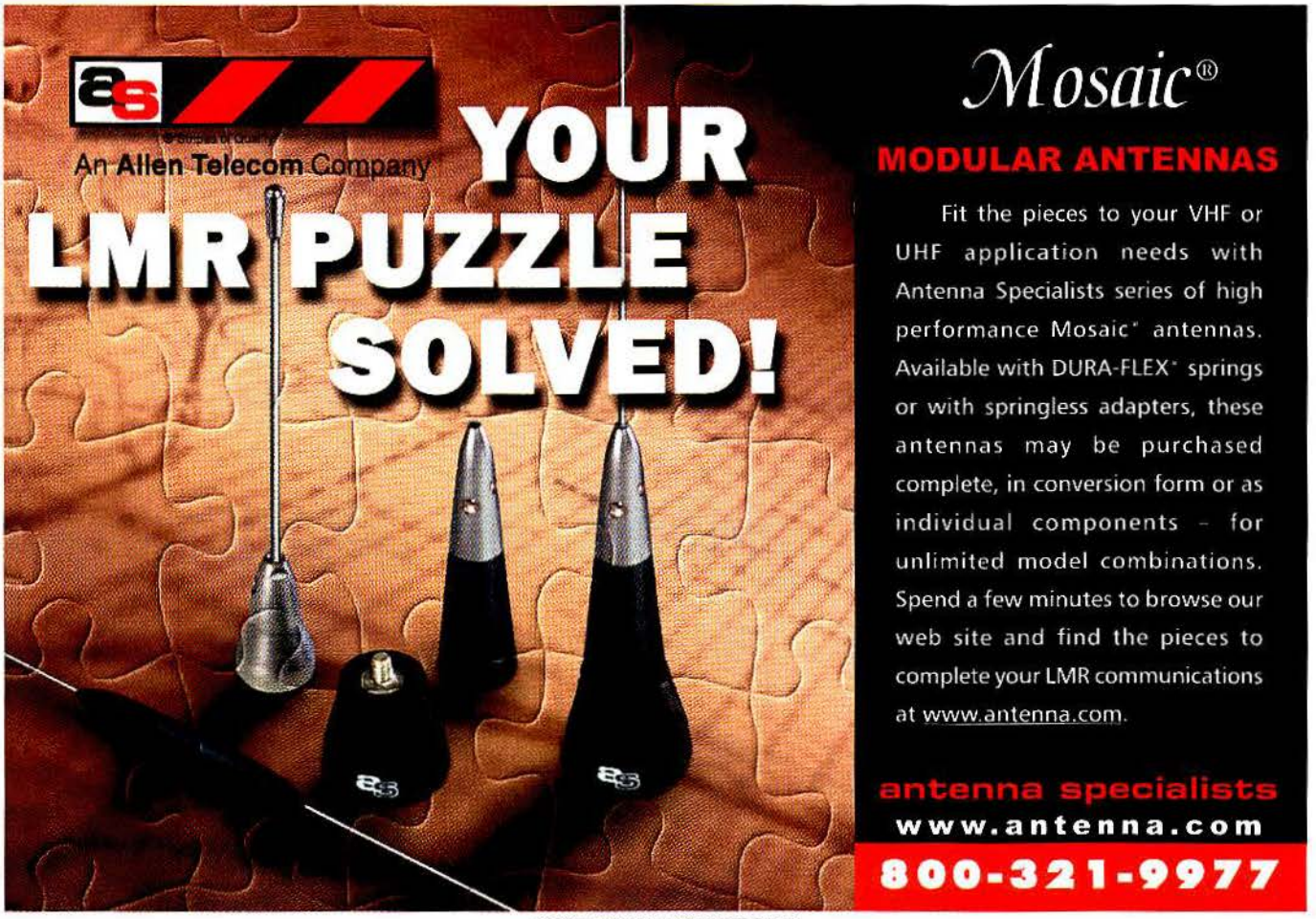
Motorola has suggested that the wireless base-to-mobile interference should be limited to a level of –63dBm in a 6.25kHz channel. For mobiles and portables operated as close as 350 feet from a wireless base station antenna, reception would be interrupted only 1% of the time.

Here's the contrast:

Under the current FCC requirement, a wireless base station antenna within 1,000 feet of a public safety base station could reduce the coverage of that base station receiver by as much as 95%. Even if the base stations were 2.3 miles apart, the public safety system could lose 33% of its coverage.

Under the current FCC requirement, public safety mobiles and portables used as close as 350 feet from a wireless base station antenna could lose communications with the public safety system as much as 30% of the time.

Motorola is in a special position when it comes to making recommendations about interference. The Phoenix police department and many other public safety agencies have interference problems



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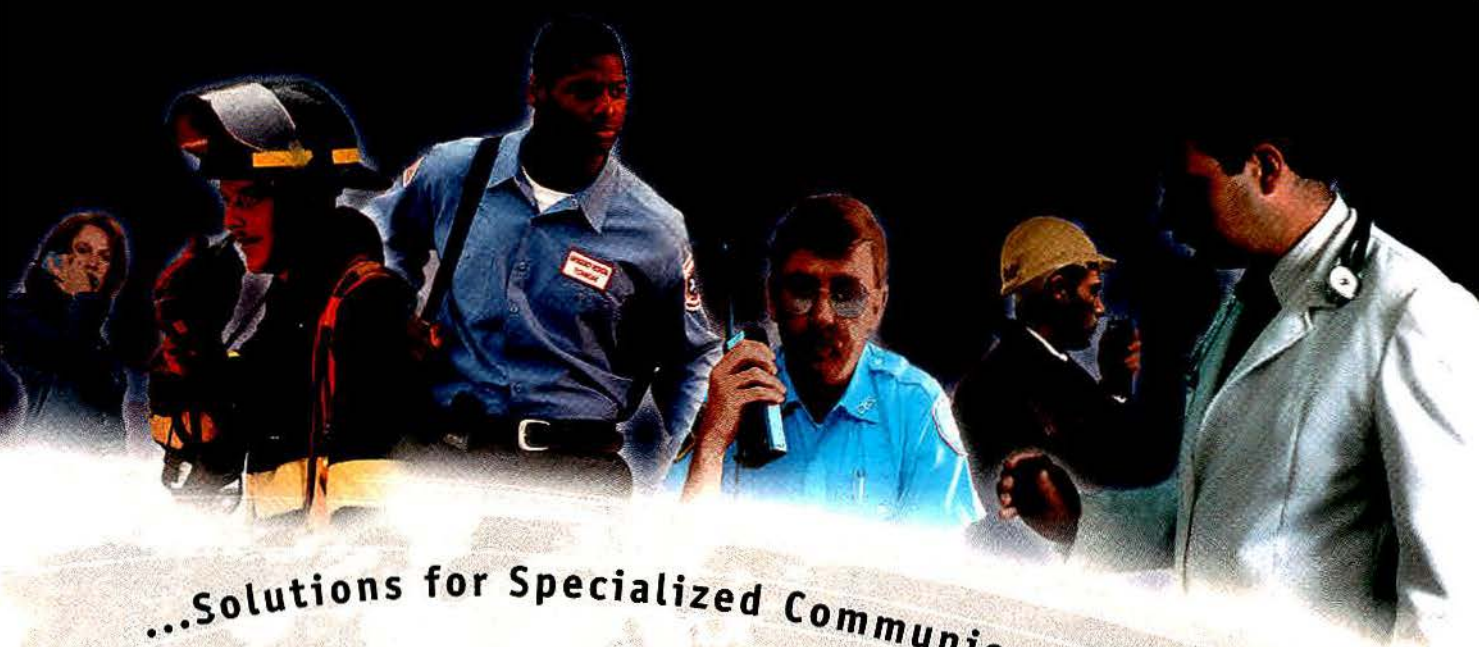

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This cluster of cellular, microwave and LMR antennas along the Phoenix skyline brings the problem of intereference into focus.

involving Nextel Communications wireless base stations. Motorola makes Nextel's equipment, and it supplies many of the agencies that have interference. Even when everyone's equipment meets specifications and is operated within current FCC limits, interference can result.

The FCC has yet to place limits that would protect public safety radio communications in the 700MHz band. In fact, last year it took steps in the name of "technical flexibility" that brought the potential for destructive interference to a virtual certainty. It was in the name of flexibility that the FCC changed the original 700MHz plan to allow wireless base station transmitters to be used in the range below 794MHz instead of limiting them to the range below 764MHz.

The FCC seems to have been

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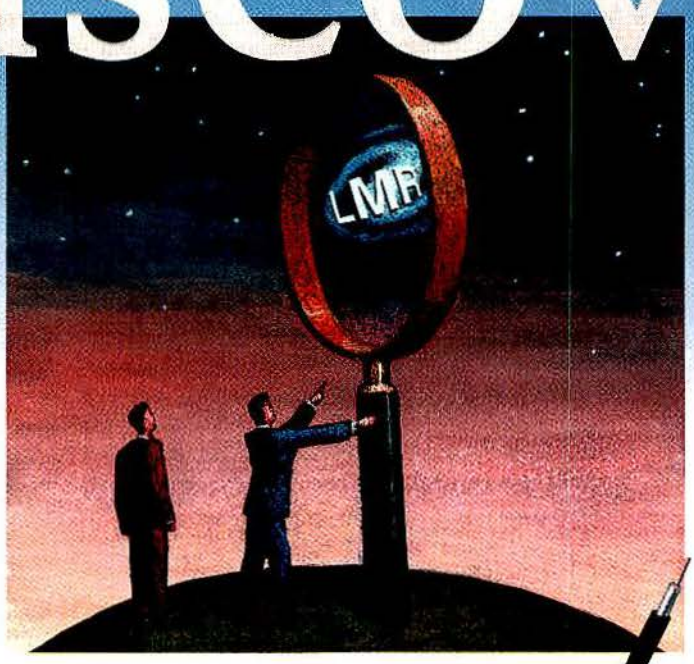


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responding to requests from wireless system operators that technical flexibility is necessary to allow wireless systems to avoid potential interference from channel 59 TV stations.

Steve Sharkey, Motorola's director of telecommunications regulation, put it this way in a letter to the FCC: "With respect to interference from broadcast stations, we believe the proper solution is to address the television incumbency issue directly. The incumbency issue should not be sidestepped by establishing inadvisable technical rules that would continue to cause harmful interference to public safety and other commercial carriers long after television stations are removed from the band."

Technical flexibility for commercial operators to locate high-powered base stations in either frequency range may result in one carrier's base transmitter operating in spectrum directly adjacent to another carrier's base receiver.

"This possibility should not be ignored by carriers preparing to bid millions in the upcoming auction," Sharkey's letter reads.

It means that what's bad for public safety could be bad for the wireless carriers themselves.

**'Best Practices Guide'**

Motorola, the Association of Public-Safety Communications Officials-International; Nextel, the Cellular Telecommunications & Internet Association and the Public Safety Wireless Network worked together to develop a "Best Practices Guide" to help those experiencing interference between wireless and public safety radio systems.

The guide provides a broad overview of practices that can be used to identify and alleviate interference between public safety systems and wireless systems, but it stops short of the recommendations made individually by Motorola.

A copy of the guide is available on the APCO Web site at **www.apco911.org**. Additional technical background can be found at: **www.Motorola.com/cgiss/NA/contact/Interference%20Technical%20Appendix.pdf**.

The Phoenix chief of police, Harold Hurtt, has circulated a letter asking for help in persuading the FCC and Congress to adopt Motorola's recommendation. A copy of the letter appears on page 96.

The public safety community's ability to protect life and property will suffer if it cannot use the 700MHz band as effectively as possible. ■

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# Seeking restitution for damages from harmful interference

OK. You've *tried* being a 'good RF neighbor.' You've *tried* protecting your system. You've *tried* being patient. Now, it may be time to sue the "offenders."

By Richard Hanno, Esq.

Almost every land mobile radio system operator is going to receive some form of harmful interference someday. For most operators, interference

matters are resolved expeditiously before business suffers. Unfortunately, there are times when the offender's uncooperative behavior requires an expenditure of valuable time and resources.

**The commission speaks**

In the past, a victim of harmful interference could only recover damages from common carriers via the Enforcement Bureau of the FCC. The good news is that there is now an *additional* forum in which to seek damages. As a result of the commission's August 2000 decision, *In the Matter of Wireless Consumer Alliance, Inc.* (WT Docket No. 99-263), interference victims can sue for damages in *state court.*

Previously, an operator who suffered damages as a result of harmful interference could not seek and prevail on a tort claim in state court. Simply stated, the commission was silent on the issue, and common carriers successfully argued that the award of damages by a state court constituted *ratemaking,* which is within the exclusive jurisdiction of the FCC. However, the commission's decision regarding WCA put this controversy to rest. The commission ruled that the Communications Act does not preempt state courts from awarding monetary damages based on state tort or contract law.

**Seeking damages in state court**

You are only entitled to one bite of the apple when it comes to recovering damages. Therefore, you should select the forum—state court or the FCC—that provides you with the biggest piece of that apple.

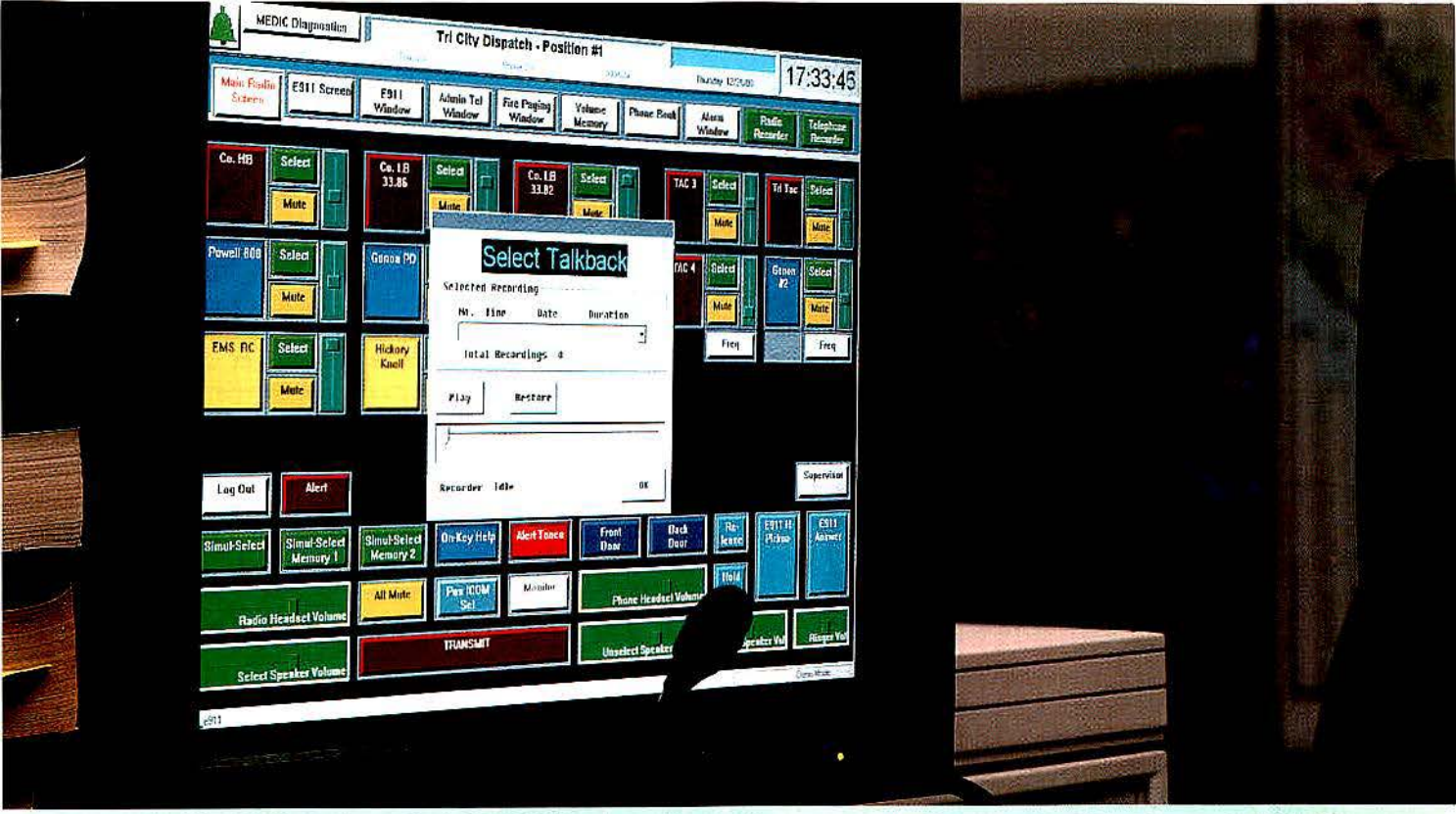
If you choose state court, you are not precluded from seeking the assistance of the Enforcement Bureau to resolve your interference problems. As a matter of fact, I recommend it. The Enforcement Bureau is far more responsive now than in the past about investigating and resolving matters of interference. Furthermore, a favorable ruling from the Enforcement Bureau constitutes an official declaration of the cause of the harmful interference, and it demonstrates to the judge that you have attempted to mitigate your injuries.

There are several benefits to having your case heard in state court. By far, the most important benefit pertains to m-o-n-e-y. If you can prove that the offender's conduct was intentional and malicious—or outrageous—you might be awarded *punitive* damages in addition to *compensatory* damages. Punitive damages are used to penalize the wrongdoer and deter others from committing the same act.

However, before you start planning a world cruise with the settlement money, keep in mind that many states have enacted legislation that limits the amounts of punitive damages or makes the burden of proof more difficult. As a matter of practice, when the Enforcement Bureau calculates a damage award, it usually considers only compensatory, not punitive damages.

In state court, besides claiming damages for lost revenue and expenses, you might be able to claim damages for future lost earnings and request payment of attorney fees. The "human factor" indirectly affects your award for damages as well. A judge or jury is more likely to sympathize with a "local"

Hanno is an associate attorney with Schwaninger & Associates, Washington.

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business person than with a major corporation and its "highfalutin'" attorneys from "out-of-town."

**Create an evidentiary record**

The newfound ability to seek relief in state court is great, but let's face it, *nobody* wants an interference problem to escalate to that level. The following process should assist in putting an end to the harmful interference. However, if the offender is recalcitrant and the interference continues, your efforts will demonstrate an attempt to mitigate your injury and will serve as a source of evidence at trial.

▶ *Identify and confront the offender* — Do not *assume* you "know" the source of the interference. Conduct the appropriate technical studies to isolate the cause, make measurements of the interfering signal's characteristics, and document the times per day, times of day, and duration of the interfering signal. After you have conducted your technical analysis and have documented the results, approach the offending party and try to resolve the matter the old-fashioned way: over a cup of coffee (or, if necessary, something a bit stronger).

▶ *Put the offender on notice and begin the paper trail* — Document your efforts: *who* you spoke with, *what* was said, *where* the conversation took place and *when* it took place. Follow up your conversation, whether it was conducted in person or over the phone, with a certified letter that summarizes that conversation and what *action*, if any, the offender promised to take and *when*. Even if you think the matter has been resolved, you must begin the paper trail immediately.

Ensure that your certified letter outlines your position: You do not intend to tolerate the interference and you expect it to be resolved by a specific time (preferably within 24 hours). Make it clear that if the interference does not cease by the specified deadline, you *will* contact the Enforcement Bureau.

▶ *Contacting the Enforcement Bureau* — If the deadline passes and the interference has not ceased, the first order of business is to contact the Enforcement Bureau's Technical & Public Safety Division, as well as the FCC's nearest regional or field office. The Technical & Public Safety Division, in conjunction with the regional and field offices, is responsible for responding to interference complaints.

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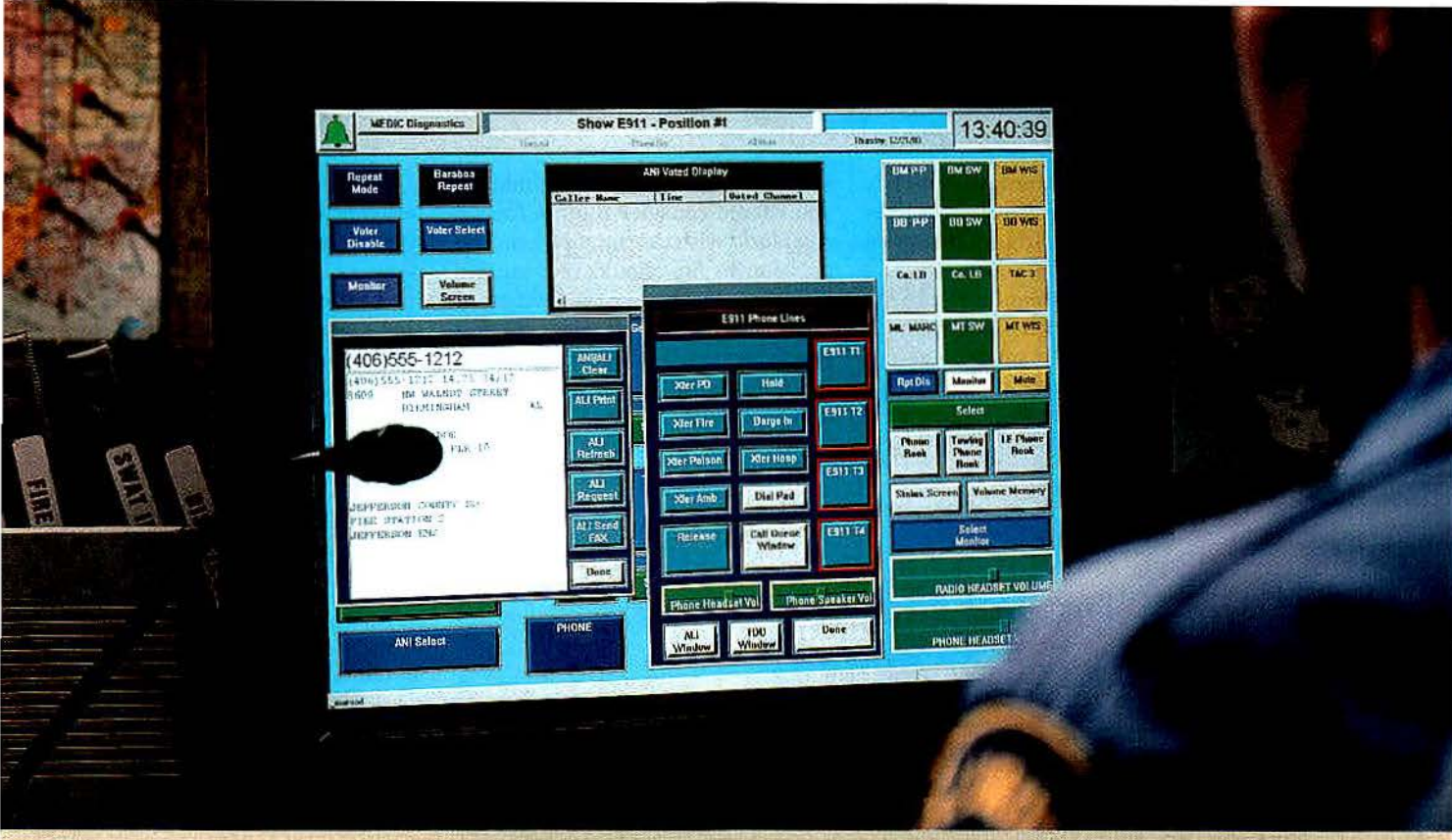


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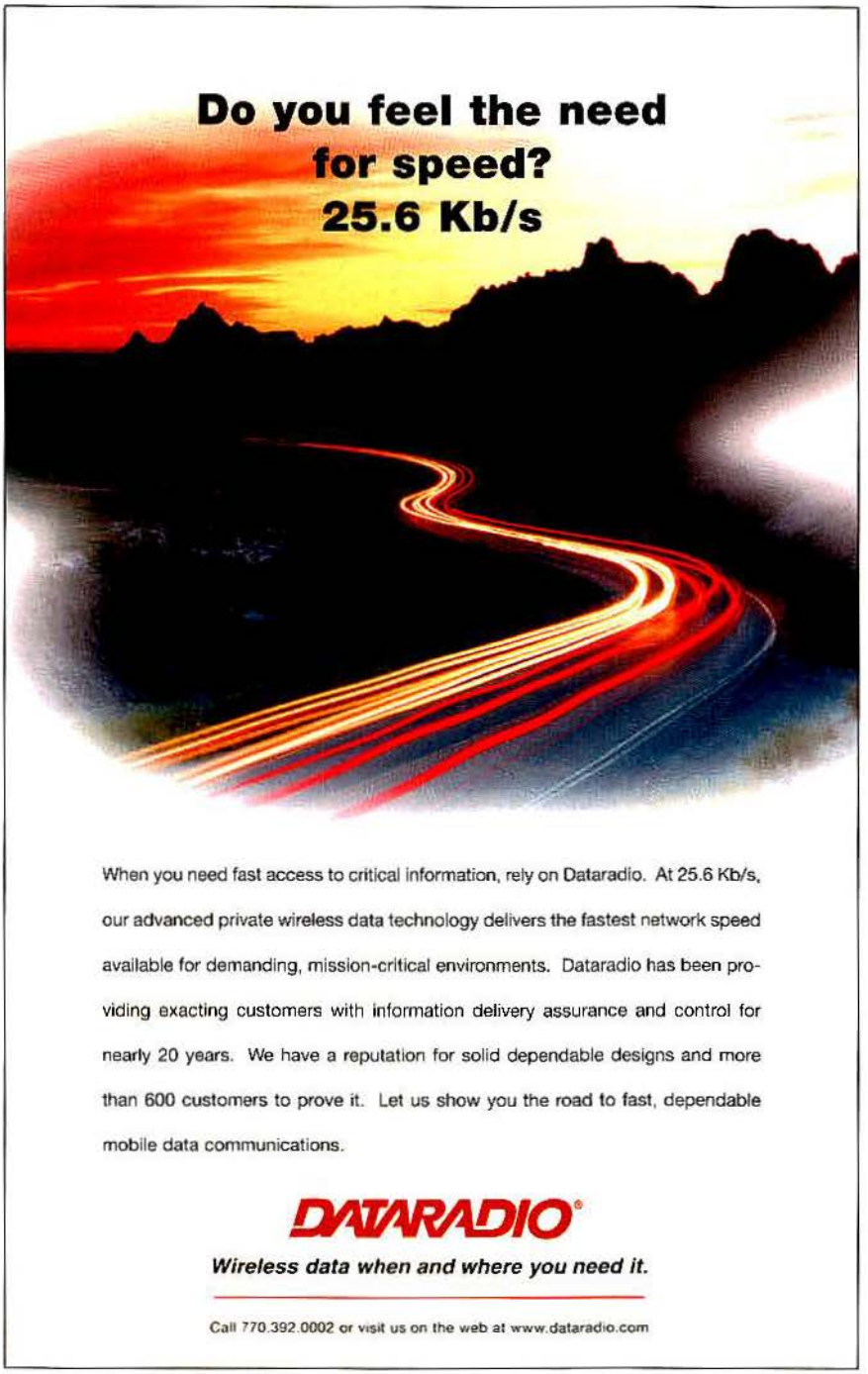
describing your attempts to rectify the matter and copies of any correspondence exchanged between yourself and the offender.

▶ *Filing a formal complaint with the FCC* — If efforts by the Enforcement Bureau's local field office have not resulted in the eradication of the interference in a timely fashion, or if you disagree with the EB's findings, you should consider filing a *formal complaint* with the commission. The decision to file should rest on two elements: 1) whether the field office provided you with an adequate and timely remedy and 2) whether you have suffered substantial money damages, such as lost revenue.

In the past, conflicts concerning interference among system operators were often discussed in a civil manner over a cup of coffee. They were resolved with a promise and a handshake. Today, resolving conflicts over interference on a personal level (owner-to-owner) is much more difficult. (More often the conflicts are now resolved attorney-to-attorney. Although this is not an improvement to the process, it does increase your likelihood of receiving damages.)

The offender is no longer a person with whom you attended high school, learned about radio propagation with in the local Amateur Radio Club or served with in the army. The harmful interference you experience is increasingly caused by a "faceless entity": a major corporation.

The Enforcement Bureau's increased responsiveness to complaints of interference, coupled with the commission's WCA ruling, should result in a more level playing field for the small operator. However, this will not be known until the ruling in WCA is put to the test in a state court. ■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# RF samplers and directional couplers

By Harold Kinley

To performance-test radio communications equipment, many small RF test devices are necessary. I carry a little toolbox reserved for small RF test devices that I often need in performing test and measurement procedures. RF sampling and coupling devices are some of those small tools that are needed in certain test procedures.

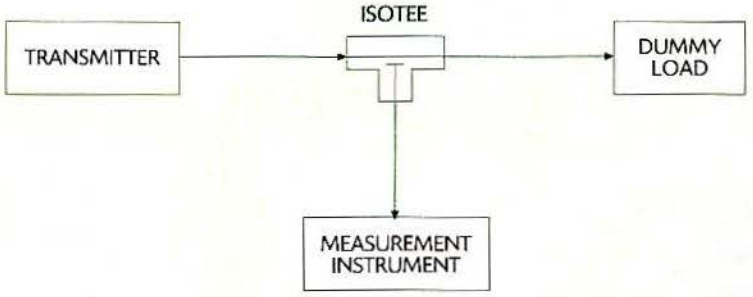


Figure 1. An isotee is used to feed a sample of the RF output from the transmitter to an RF measurement instrument. The instrument might be a spectrum analyzer, a modulation meter or a frequency counter. The purpose of the isotee signal sampler is to reduce the level of the RF signal fed to the measuring instrument without upsetting the impedance of the line that passes through the isotee. Suppose that the transmitter produces an output of 50Ω (47dBm) and that the maximum safe RF input to the measuring instrument is 20dBm. Then the isotee produces a RF sampling level that is below the maximum safe RF input to the instrument without upsetting the line impedance.

### Isotee connector

Perhaps the simplest signal-sampling device is the homemade UHF tee connector that has been modified to form an isolated tee, often called the *isotee*. Figure 1 above shows how an isotee is used to sample a small portion of the transmitter RF output signal to feed the input of an RF measurement instrument. In this arrangement the isotee is a signal *sampler*.

The isotee is made from a regular tee connector such as a UHF tee connector. Remove the center pin of the male part of the connector and cut it short. Cut a small slot into the sawed-off end of the pin so that a screwdriver can be used to reinsert the pin into the tee connector. Connect an RF measuring instrument to the isotee through a *barrel* connector. It is important that the center pin of the tee connector does not make direct dc contact with the barrel's center connector. If it does, it will not provide isolation, and it might damage the RF measuring equipment. To be safe, use an ohmmeter to ensure that no direct contact exists between the barrel's center pin and the center of the tee connector.

Figure 2 at the right shows how the isotee is used to make a signal *coupler*. This can be used to inject a signal into the line ahead of the receiver input. The setup shown in Figure 2 can be connected as shown in Figure 3 on page 36 to test for noise or interference degradation to the receiver. First, connect the 50Ω termination to the isotee, and set the signal generator to produce 12dB SINAD at the receiver's audio output. Then, remove the 50Ω termination and connect the antenna instead. Again, the signal generator is set to produce 12dB SINAD at the receiver's audio output. The increase in signal generator level indicates the severity of noise or interference degradation at the site. Similar isotee connectors can be constructed using type N or type BNC connectors.

### Directional coupler

A directional coupler can have three or four ports. For our purposes, we will limit the discussion

Figure 2. The isotee arrangement for signal injection is shown here. The modified tee connector is connected to a standard tee connector through a 'barrel,' or straight connector. For signal sampling, the bottom tee connector is omitted, and the measuring instrument is connected to the barrel connecter.

Contributing editor Kinley, *MRT's* technical consultant and a certified electronics technician, is regional communications manager, South Carolina Forestry Commission, Spartanburg, SC. He is the author of *Standard Radio Communications Manual, with Instrumentation and Testing Techniques*, which is available for direct purchase. Write to 204 Tanglewylde Drive, Spartanburg, SC 29301. Kinley's email address is **hkinley@home.com.**

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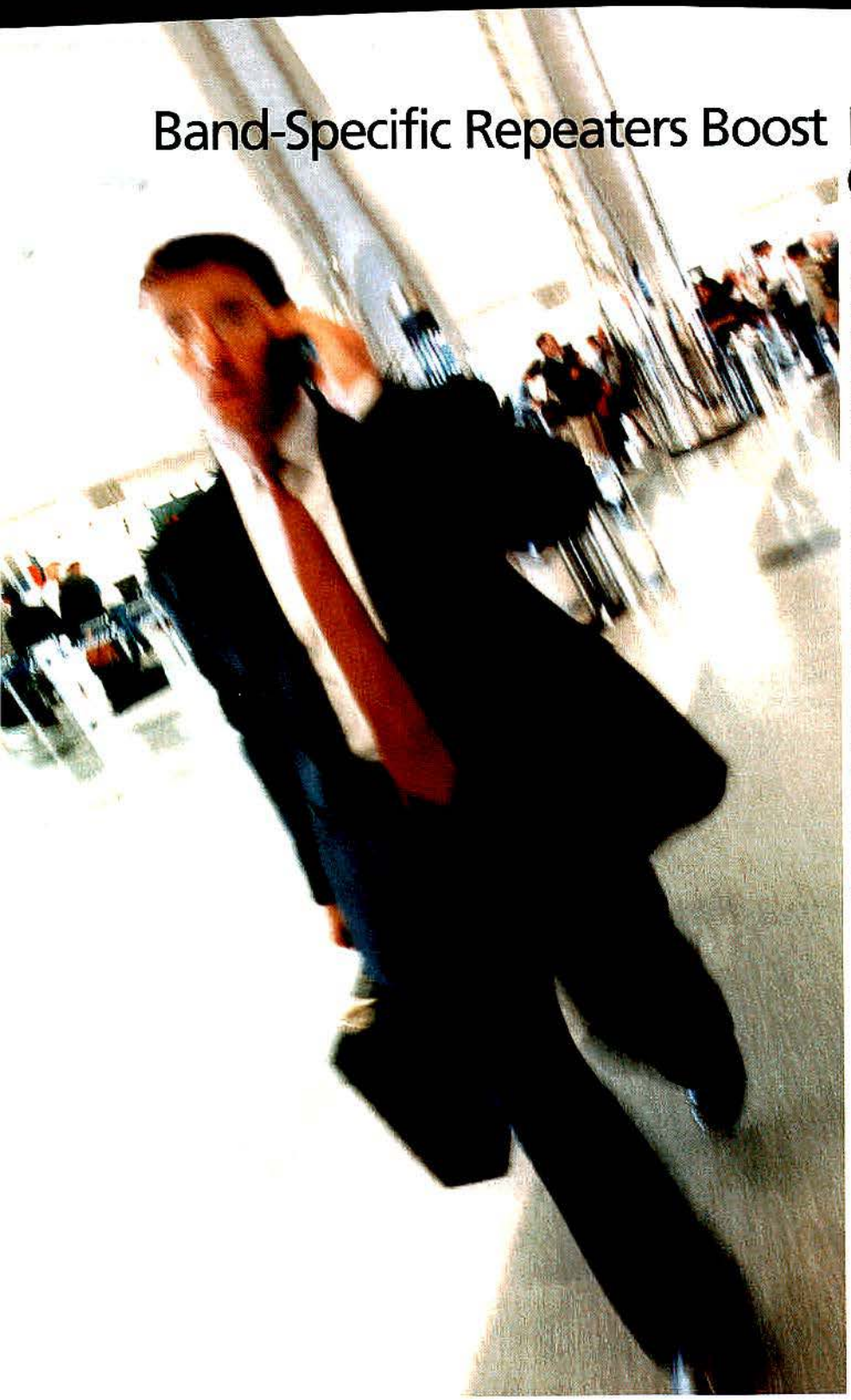

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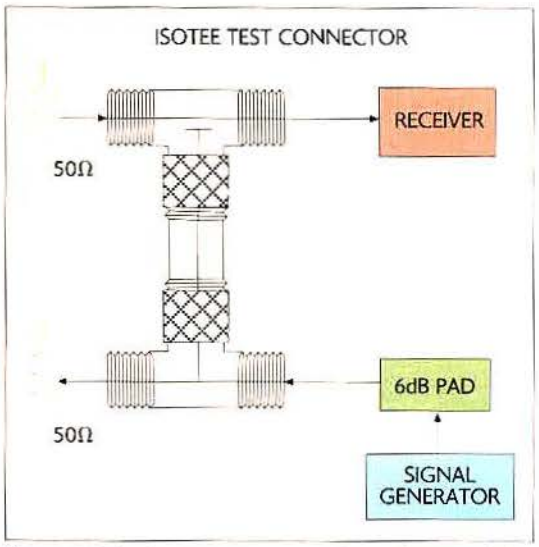
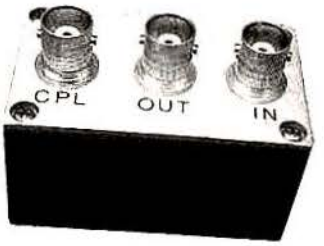



Figure 3. The isotee arrangement is used to check for receiver sensitivity degradation due to noise or interference onsite. The attenuation pad between the signal generator and the bottom tee connector maintains a more constant load on the signal generator, and the 50Ω termination on the left side of the bottom tee connector properly terminates the signal generator.

to the three-port directional coupler. We will treat the device as a black box and avoid its internal workings. The photo at the right shows a directional coupler that can be used for low-power or small-signal applications.

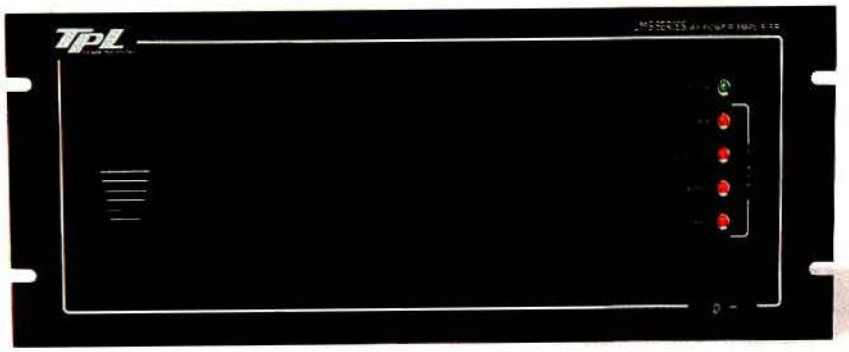
One of the most important specifications of a directional coupler is *directivity*. The simplest way to describe this is to show how it is measured. Figure 4 on page 38 shows a spectrum analyzer connected to the *coupled* (CPL) port. A signal generator is connected to the input port and set to an output level of 0dBm with no modulation (CW). The output port is terminated in a 50Ω impedance. The difference in the signal level of the input port and the level of the coupled port is equal to the coefficient of coupling. This is stated in decibels. For example, with 0dBm applied to the input port and a signal level of –20dBm




This is a Minicircuits model ZDC-20-3 directional coupler. It is a low-power, or small-signal, device. Various models are available for different frequency ranges and other specifications.

measured at the coupled port, the coupling coefficient is 20dB. This will vary somewhat with the frequency of the signal, and it will be stated in the specifications of the directional coupler. The signal level measured at the coupled port is recorded as a reference level for the signal in the forward direction.

Next, reverse the input/output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# VOICE Plus ENCRYPTION SCRAMBLER

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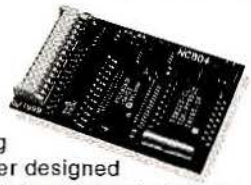

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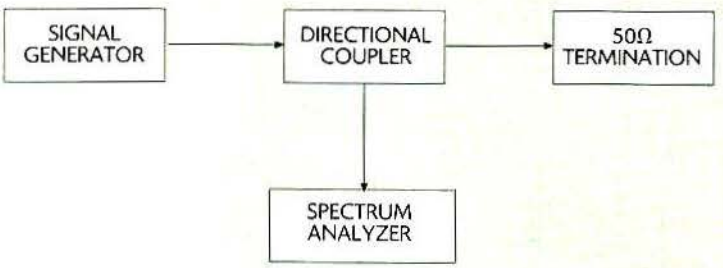


Figure 4. This equipment arrangement can be used to measure the directivity of the directional coupler. First, this setup is used to establish the reference level of the forward signal at the coupled port. Then, the input/output connections are reversed and the measurement taken again. The difference in the signal levels is equal to the directivity of the directional coupler.

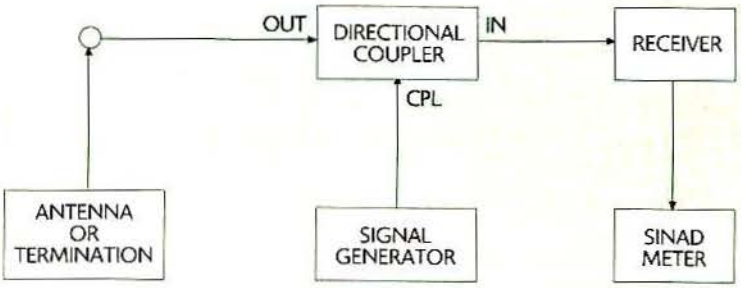


Figure 5: Here, the directional coupler is used for signal injection in order to test for receiver desensitization due to site noise or interference.

connections and note the signal level at the coupled port with the spectrum analyzer. Suppose that the signal level at the coupled port is now –60dBm. This means that the signal level at the coupled port is 40dB below the reference reading in the forward direction. Therefore the directivity of this directional coupler at this operating frequency is 40dB.

If the 50Ω termination is removed from the input, the signal level at the coupled port will increase to nearly –20dBm, the same as it was in the forward direction. Such an arrangement could be used as a reflectometer.

The input power rating of the device must be observed to avoid damaging the directional coupler. The mainline insertion loss is the loss from input to output, or vice versa. It should be small. To use the directional coupler as a method of signal injection in place of the isotee discussed previously, use the arrangement shown in Figure 5, above. Because this is the reverse of the normal use of a directional coupler, the input/output connections are reversed. The output port becomes the input port as far as the direction of signal flow is concerned.

When using a directional coupler, pay particular attention to such specifications as input power level, mainline insertion loss, directivity, coupling coefficient and operating frequency.

Special in-line tap-offs are available, as are sampling taps on some in-line wattmeters. Some are adjustable; others are fixed in the coupling level.

Whatever coupling method you use, make sure that you don't exceed the power input limit to either the measuring instrument or the coupling/sampling device itself. You will "let the smoke out," and you know what happens then.

Until next time—*stay tuned!* ■

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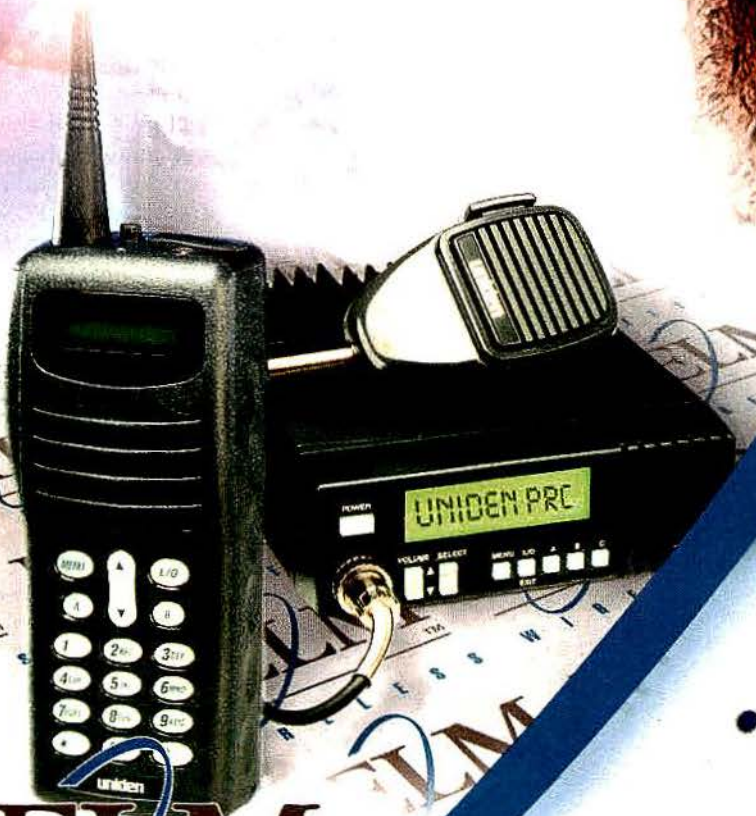


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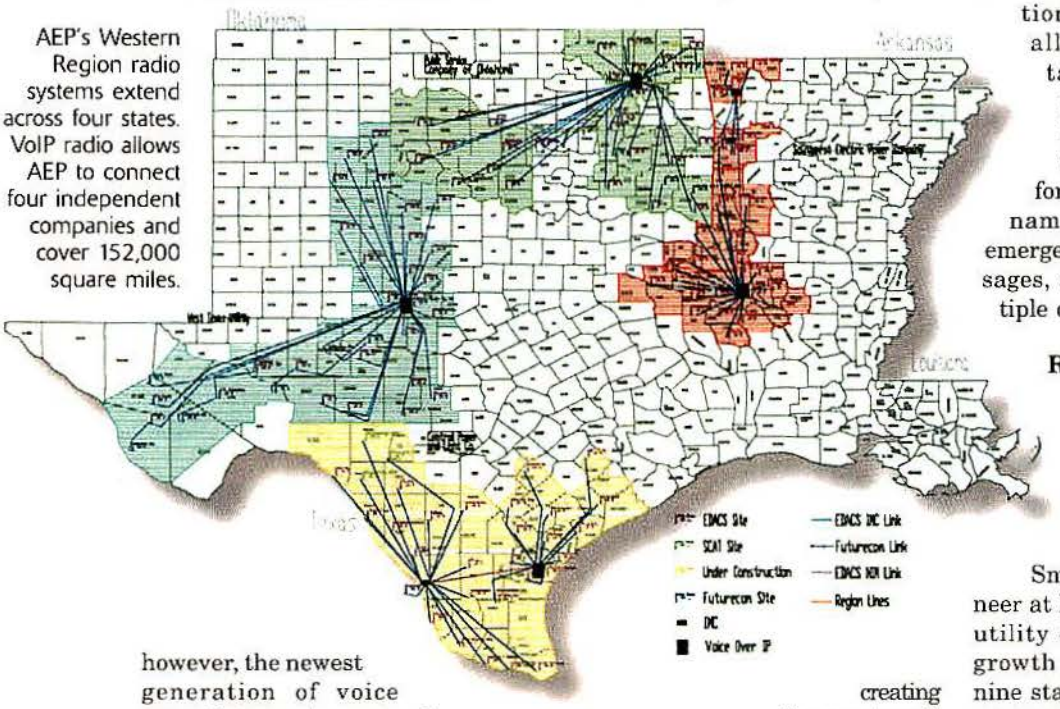
# Voice over IP: The next generation

Transmitting voice traffic over Internet protocol offers a cost-effective way to enhance existing communications operations without adding extensive new infrastructure.

**By Robin Grier**

In this age of downsizing and budget cuts, voice and data communications between the field and the office are more important than ever.

The need for wide-area dispatch, interoperability and backup dispatch once created challenges for utilities, municipalities and other land mobile radio users. Now, however, the newest generation of voice over Internet protocol technology can provide an effective, cost-efficient resolution of these issues.




AEP's Western Region radio systems extend across four states. VoIP radio allows AEP to connect four independent companies and cover 152,000 square miles.

One company benefiting from the newest technology is Columbus, OH-based American Electric Power. AEP's Western Region (Texas, Louisiana, Oklahoma and Arkansas) consists of four operating companies, each with its own independent two-way radio network.

Previously, AEP's mobile data help-desk and network operations center employees could talk with vehicles within the operating company where they were located, but not to the other three. This handicap was affecting customer service, costing extra money and creating frustration all around. Things turned around when AEP looked to VoIP as a way to not only connect all four companies, but also to connect them using existing radio equipment, covering 152,000 square miles of territory.

Catalyst Communications Technologies, Lynchburg, VA, provided IP Radio to AEP. The system routes voice from two-way radio users across an existing wide-area network or local-area network to standard desktop PCs, with some transmissions traveling more than 700 miles and traversing at least five routers. It also allows users to monitor multiple radio systems from a single PC. Second-generation advanced capabilities allow users to change talkgroups and systems from an authorized remote PC, search and sort a centralized database of users for individual calls, view the name of the caller as well as emergency and radio system messages, and scan audio from multiple operating companies.

## Reduced equipment cost

"The problem of independent radio systems within a large company is common in today's ever-consolidating utility industry," said Jim Smith, communications engineer at NiSource, whose operating utility companies serve a high-growth energy corridor through nine states. NiSource is a holding company whole operating companies engage in all phases of the natural gas business. "As companies merge or reorganize across states, they need to consolidate

Grier is president of Catalyst Communications Technologies, Lynchburg, VA. (www.catcomtec.com). He can be reached at info@catcomtec.com or 804-582-6146.

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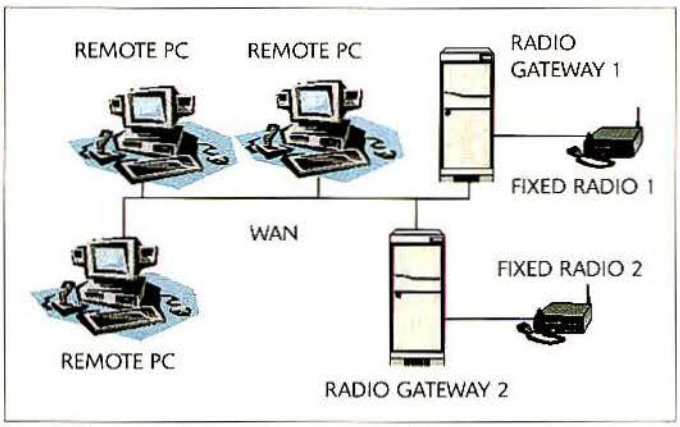
weekend dispatch and special assistance functions for different regions. The cost of installing or relocating leased telephone lines and radio equipment is prohibitive," Smith said.



The architecture of an IP Radio system provides a gateway between mobiles and PC dispatch stations that may be hundreds of miles apart.

Even if a company is willing to pay for dedicated circuits to connect a new location, providing the desk space and managing all the radio units needed for given job functions are problematic, Smith said.

"Incompatible radio systems or the need to consolidate the work groups of the two companies may also present problems. Different companies may have different frequency bands or even worse, different trunking protocols."

Barry Martin, director of emergency communications for the city of Lynchburg, VA, also sees interoperability advantages. Lynchburg's radio system serves police, fire and public works across two central Virginia counties and two cities. Martin said VoIP is a useful tool for interoperability among municipalities that need to communicate but that may have different radio systems. Having the radio consolidated into an existing PC is another plus because it frees desk space of cumbersome dedicated radio clutter.

"Not only can IP Radio tie different agencies together, it provides cost savings to our users by linking offices to field workers and reducing the amount of work space required," Martin said. The system also increases the value of the city's existing investment in fiber optics by allowing radio traffic to be routed across the fiber network in the same data stream with other computer applications, he said.

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At AEP, using the existing radios and infrastructure was also important because the company couldn't justify the cost of connecting the four areas of its Western Region. All of AEP's 248 transmitter sites are 800MHz EDACS (Enhanced Digital Access Communications System), Com-Net Ericsson's trunked radio system. As such, they can take advantage of second-generation VoIP through any transmitter site.

The VoIP approach places a mobile radio anywhere within the coverage area of each operating company. The audio from each mobile radio is fed across AEP's WAN—not only to the help-desk and network operations center, but also to other employees who want to take advantage of the technology's features.

The time and money AEP once spent on telephone calls is now a thing of the past. Before the company installed VoIP, field workers had to find a pay phone and make a long-distance call to the help-desk when they had problems. These hidden costs didn't show up on any department's profit-and-loss statement, but they were real. Worker frustration was also real, and it was a drain on productivity.

Now, field workers use the two-way radios in their trucks to talk directly with the help-desk. The time, money and hassles associated with pay phone calls have vanished, and productivity has risen.

At NiSource, Smith was initially concerned that voice quality would be lost by routing radio transmissions over a WAN instead of over dedicated phone circuits. He had experimented with some of the free Internet telephony services and was unimpressed. Smith found that VoIP didn't suffer from the gaps, distortion and delay of some Internet telephony applications.

"Most radio users don't even know they are talking through the computer network," Smith said "Even the first syllable is routed every time. The voice quality is superb."

"We've developed a better-than-VOX solution," said Curtis McKim, technical leader at Catalyst. "Working with Virginia Polytechnic Institute, our team created this technology specifically for land mobile radio users. The

Now, field workers use the two-way radios in their trucks to talk directly with the help-desk. The time, money and hassles associated with pay phone calls have vanished, and productivity has risen.

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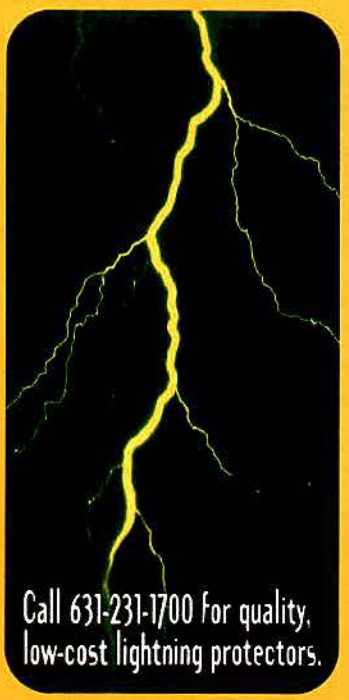

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approach provides true push-to-talk functionality. In addition, when one PC talks, all the other PCs can hear the transmission."

Smith had additional concerns that this VoIP product would consume excessive bandwidth on the utility's network, but according to McKim, "IP Radio routes audio packets only when someone is talking. Thus, when the talkgroup is idle, there is virtually no network traffic. When someone is talking, the audio is sent out only once, even if a dozen PCs are listening, using a computer-networking technique called *multicast*. The audio is compressed before it is routed, further reducing network traffic."

NiSource was able to easily integrate VoIP into its operations, Smith said. "It rides on top of our existing network traffic, without causing congestion or other WAN problems. We hardly even know it's there."

### Desktop dispatch

By shifting from a hardware-based approach (traditional telephone-set-like remotes) to a software-based technology (PCs), placement of radio access positions is much more flexible than before. The initial installation is quick and straightforward. Later, when the inevitable office moves occur, relocation is even simpler.

Catalyst's approach uses a client-server architecture, with the client running on a standard PC. This approach calls for at least a 233MHz processor in the desktop PC, at least 64M of RAM and an off-the-shelf duplex sound card so users can hear radio prompt tones on each transmission. McKim's team identified a few sound card types incompatible with Windows NT, but found most modern PC hardware sufficient.

For NiSource's Smith, the ease with which he can add clients to the network is a plus, and his customers like the flexibility for varying access among users.

"It's a two-step process," Smith said. "First, we enable the client on the appropriate server. As we add more servers we'll be able to control access for some users by restricting which ones they can use. We can also specify whether or not the PC user will have 'supervisory' privileges."

Both supervisory and standard users can make and accept individual calls. Supervisory users can also change trunked talkgroups and systems, preempt standard users and activate the radio's scan function. Allowing only a few people to change the settings reduces confusion about which audio office-based users are listening to, further increasing efficiency. This flexibility is one of the benefits of the software-based VoIP approach.

The second step in the process is loading client software on the remote PC. Typically, this involves sending the user an email that tells him where to find the setup file on the network. The setup file runs a wizard to install the software on the machine, and the client can be ready for action in less than 15 minutes.

Relocations of dispatch positions are even easier. At AEP's facility, the help-desk changed floors without rerouting coaxial cable and dedicated circuits. They just unplugged their PCs on one floor and plugged them back in on another.

### Direct access

AEP's network operations center can provide faster service to customers and is using less manpower to get the job done. When a field technician is working a problem, it's critical that the situation be resolved immediately. In the past, the field technician would relay information through a local dispatcher who would call the NOC by telephone to pass on the information. Now, the technician can speak directly to the NOC.

Direct-radio access is also key for AEP's mobile data users. When truck-based mobile data computers need to be rebooted, the utility can broadcast instructions to all MDC users through its direct VoIP link, saving time and money. VoIP

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also saves manpower when mobile data users need to talk one-on-one with the help-desk. Such conversations can be restricted to only those involved so other users are not distracted.

Just knowing who is calling can also speed operations. When a radio is transmitting, the system detects the unique identification number of the calling radio, translates it to a full first and last name and displays the name on the remote PC.

Likewise, when another PC is transmitting, the receiving PCs not only "hear" the audio but also "see" the user name of their caller.

At NiSource's Indiana facility, VoIP gives users a tool for talking one-on-one by raising the EDACS individual call feature to a new level. "Office personnel can access a full directory of radios," Smith said. "They can sort the list by first name, last name, department and home region. They can even search the list electronically. They find the person they want to talk to, double-click and transmit. It's that quick."

Field workers can also make an individual callback to support employees. The PC rings if no one responds in the first 30 seconds. This was an important feature added to the second-generation product. During development, utility engineers realized that ringing alone was insufficient. With many different regions feeding the same PC, it could take time to determine where the call was coming from. The product's global view window provides a summary presentation of all the server locations. But when multiple locations were simultaneously routing individual calls, it was hard to tell which one had not been answered, so Catalyst added a ringing icon to the global view window.

"The combination of the ringing and the icon alerts them to the need and directs them right to the caller almost instantly," McKim said.

The PC-based approach lends

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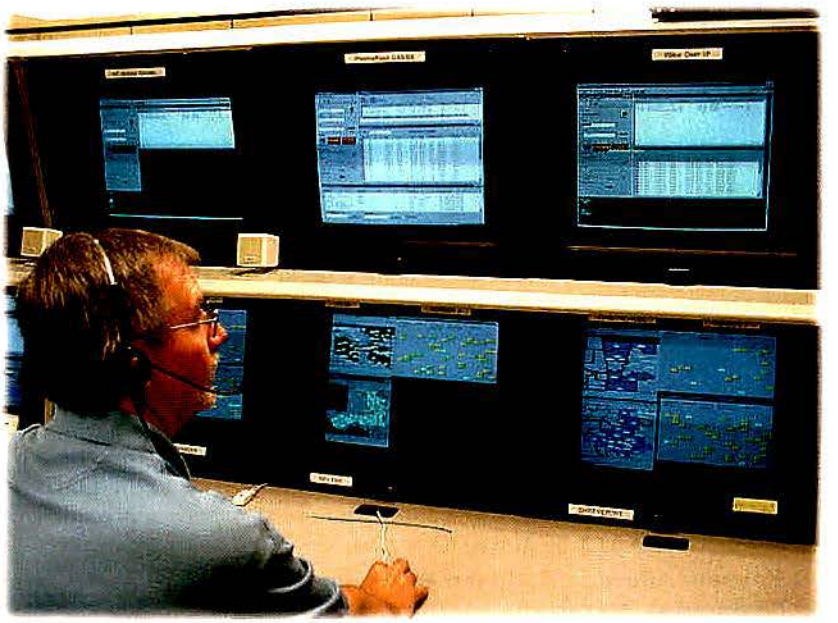
itself to other advanced capabilities like call history, on-line help and a presentation that's easy to learn as you go. The call-history window presents the most recent 32 calls from each location. If a PC user is busy on another call or away from his desk, he can see who called, when the person called and how long they talked. It also indicates if another PC user took the call and responded.

These are features that public safety agencies especially value, said Martin. "IP Radio provides critical, real-time information to [educate] workers about who is using the radio system and how much they are using it."

Emergency communications workers also benefit from tools such as on-line help. Detailed descriptions of how to operate the system, along with intuitive visual presentation, reduce training time and eliminate uncertainty for new workers.

"Experts that used to convey their knowledge via a dispatcher now feel comfortable clicking on their PCs and talking directly with the field," Martin said.

The graphical user interface on their PC screens helps users understand what's going on, Martin said. "For instance, the interface changes when a user makes a group call vs. an individual call. Radio users often get mixed-up. They think they're transmitting to only one person when they are actually broadcasting to many. This creates confusion and wastes time. The PC screen makes it clear to whom they are talking, saving vital minutes."



Eddie White uses IP Radio in the network operations center.

VoIP users find that once they have it, they can quickly discover new ways to take advantage of its flexibility. At NiSource, the system will enable the testing of radio systems across the company's nine-state territory, Smith said. "We'll be able to test every system we have from one PC at company headquarters."

In Virginia, Martin envisions using VoIP technology as a backup for public agencies' full-featured consoles. "Because it uses different hardware, software and connections, the technology provides a lot of useful redundancy," he said. "When you also consider that VoIP remotes can be brought up quickly in almost any location across the region, the technology opens up powerful possibilities, not only for backing up a disabled operations center, but also for supplementing recovery efforts during storms and other disasters." ■

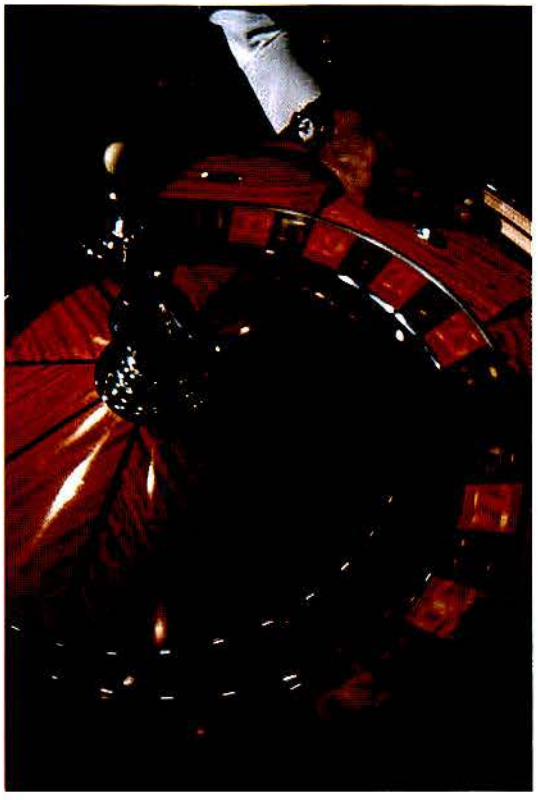
CIRCLE (40) ON FAST FACT CARD

# SHOW PREVIEW

The International Wireless Communications Expo comes around but once a year, so it's important to get the most out of it while it's here. This year the conference presents seminars and programs on issues including the status of channels 60–69 and how to survive and win the auction process. The Public Safety Track is expanded this year to include the latest information on interoperability, TETRA and 700MHz. The following events are can't-miss opportunities to stay informed in the radio industry.

❑ **TETRA Seminar**
**Tuesday, March 27**
**1 p.m.–5 p.m.**
The North American TETRA Forum (NATF) will be hosting a seminar on the advantages of adopting TETRA in North America. The seminar will include presentations by manufacturers and users of TETRA. There is no cost to attend the seminar, but pre-registration is required. Contact the NATF by March 11 at 651-698-7300.

❑ **Keynote Address: Kathleen Wallman, Chairman, NCC**
**Wednesday, March 28**
**9 a.m.–10 a.m.**
As the chair of the Public Safety National Coordination Committee, a federal advisory committee chartered by the FCC, Kathleen Wallman will focus in her keynote address on the work of the NCC and its efforts to develop standards to support interoperability in the new public safety spectrum in the 700MHz band. Wallman will address what the NCC is doing to ensure that public safety responders no longer have to ask, "Why can't we talk to one another?"



❑ **RCA Breakfast Meeting**
**Thursday, March 29**
**7:30 a.m.–9 a.m.**
The annual Radio Club Breakfast will be held at the Las Vegas Hilton. Reservations are required. Register at the Radio Club of America booth on Wednesday, March 28.

❑ **25th Anniversary '70s Reception**
**Tuesday, March 27**
**5 p.m.–6:30 p.m.**
Swing back to 1976, the first year of IWCE, at this "groovy" '70s-themed party. Open to exhibitors, workshop attendees and conference pre-registrants only.

❑ **IWCE Live!**
Log onto **www.iwceconexpo.com** or **www.mrtmag.com** to find live news updates from the show floor. The IWCE Live! site will feature breaking news on site, daily stats and conference highlights, product announcements, industry insights, and snapshots of the show.

## Base station workshops

This series returns to IWCE as a vital part of the comprehensive programming for base station operators and technicians, designed specifically for their needs. Whether you're a novice or a veteran, IWCE's Base Station Workshops offer solutions you can put to use right away.

Understanding base station RF electronics
Monday, March 26
8:30 a.m.–12:30 p.m.
This workshop provides an overview of wireless base station subsystem functions.

Evaluating base station RF performance
Tuesday, March 27
8:30 a.m.–12:30 p.m.
This workshop will take a comprehensive look at test and measurement issues facing anyone charged with ensuring optimum base station performance.

Telecommunications grounding practices
Wednesday, March 28
8:30 a.m.–12:30 p.m.
Improper gounding accounts for as much as 40% of costly power-related problems to telecommunications equipment. Learn proper grounding techniques.

Measuring the wireless transmission spectrum (T2)
Thursday, March 29
2:45 p.m.–6:00 p.m.
Discover the power of the latest spectrum-based measurement and analysis techniques for the wireless spectrum.

# SCHEDULE OF EVENTS

## Monday, March 26, 2001

**8 a.m.** **Registration (Workshops only)**
8:30 a.m. Base Station Workshops: Understanding base station RF electronics
9 a.m. Radiation Safety/Compliance Workshop (Session runs from 9 a.m.–5 p.m.)
1:30 p.m. Base Station Workshops: Understanding the wired-to-wireless interface

## Tuesday, March 27, 2001

**8 a.m.** **Registration (Workshops only)**
8:30 a.m Base Station Workshops: Evaluating base station RF performance
9 a.m. PCIA Workshop: Preparing for today's wireless marketplace, regulatory requirements & technologies
12 p.m. SBT Jam Session, Alexis Park Hotel
1 p.m. TETRA seminar
1:30 p.m. Base Station Workshops: Antenna, transmission line and propagation basics
5 p.m. 25th anniversary '70s reception

## Wednesday, March 28, 2001

**7:30 a.m.** **Registration opens**
8:30 a.m. Base Station Workshops: Telecom grounding practices
9 a.m. Keynote address
**9 a.m.** **Exhibit hall opens**
1 p.m. Business & Tech Track—Facts and cracks in the crystal ball: Where the industry is headed
Public Safety Track—Interoperability: Dream? Reality? Status update
Regulatory Track—The 700MHz band for private radio operators
2 p.m. Business & Tech—What you should have asked your CPA: Financial tips for small business
Regulatory—Equity in interconnection: Leaning on the LEC
Public Safety—Contracting for public safety
3 p.m. Business & Tech—Beyond dispatch: Alternative markets for local operators
Public Safety—Beyond the norm in system design
Regulatory—Meet the press
4 p.m. Public Safety—Simulcast in public safety communications

## Thursday, March 29, 2001

7:30 a.m. RCA breakfast meeting
**7:30 a.m.** **Registration opens**
7:30 a.m. 4th Annual Simulcast Forum, Hilton Hotel
9 a.m. Regulatory—Formal complaints: The new competitive weapon and threat
Public Safety—Voice over IP
Business & Tech—The newest wireless gateways to home and office
**9 a.m.** **Exhibit hall opens**
10 a.m. Regulatory—Beyond the FCC: Using local courts to obtain relief.
Public Safety—RF site safety awareness
Business & Tech—Lights, camera, sale!: Advertising techniques for local operators
11 a.m. Business & Tech—Update on FCC: Using local courts to obtain relief.
Public Safety—Partnership Program
Business & Tech—Asset sales: Dealing with crafty consolidators
1 p.m. Public Safety—Prying the purse strings: Effective techniques for getting funding
Fundamentals of radio communications
Regulatory—FCC open forum
Business & Tech—Introduction and strategies for m-commerce
2 p.m. Public Safety—It's about data
3 p.m. Regulatory—Licensing the VHF/UHF trunking systems and the goal of exclusive use
Public Safety: The 700MHz band
Business & Tech—State of the tower industry: The local operator is still king
4 p.m. Regulatory—Update: What's new in D.C.?
Public Safety—The role of test in digital radio systems
Business & Tech—International opportunities: Overseas but not overlooked

## Friday, March 30, 2001

**7:30 a.m.** **Registration opens**
9 a.m. Regulatory—Dealing with TVI before the FCC
Public Safety—Regional success story: San Diego
Business & Tech—Talk Back!: The manufacturers answer your questions.
**9 a.m.** **Exhibit hall opens**
10 a.m. Regulatory—Stories of FCC auction survivors
Public Safety—The migration path to interoperability
11 a.m. Public Safety—Privatization of critical communication networks
Business & Tech—Trunking protocols: Many more are emerging. Which will dominate?

The following preview information was supplied by the exhibitors. Information for listings and booth numbers is accurate as of press time and is subject to change.

**1st Contact Technologies** **Booth 1331**
*Existing products*
Farvillage.com, broadband wireless Internet delivery network.
*New products*
Wireless Internet and distance learning franchise opportunities for local entrepreneurs.

**AC Data Systems** **Booth 568**
*Existing products*
Surgeblox, transient voltage surge suppression modules and panels; Telco, data, T-1 and E-1 protectors; Spectx, integrated load center

**AC/DC Industries** **Booth 375**
*Existing products*
MZL-10F delay timer (15, 30, 45 and 60 minutes); MZL-10S delay timer (30, 60, 90, 120 minutes); MZL-10SS delay timer (2, 4, 6 and 8 hours); MZL-18 delay timer.

**Adtran** **Booth 1076**
*Existing products*
Unlicensed spread-spectrum digital microwave radio systems; Tracer dual T1 and dual E1 capacity radios at 2.4GHz and 5.8GHz; channel bank and multiplex equipment for carrier and enterprise applications.
*New products*
Tracer 10 Base T radio; protection switching for Tracer equipment; Nx64, user-selectable 1–24 DSO data radio with v.35 interface.

**Advance Label & Tag** **Booth 971**
*Existing products*
Custom nameplates for radios, pagers, cellphones and other wireless equipment; warranty and tamper-proof labels; screen printed metal, vinyl or polyester labels; indigo digital or flexographic printed vinyl or polyester labels.
*New products*
Indigo digital printed vinyl or polyester labels using four-color process printing with custom die-cutting to customer's specifications.

**AEA Wireless** **Booth 368**
*Existing products*
Full line of hand-held, graphical SWR/returnless meters for 100kHz–54MHz, 30MHz–150MHz, 140MHz–525MHz and 806MHz–960MHz; Cablemate and TR3120 TDRs.
*New products*
Cellmate II 700MHz–1GHz analyzer.

**AF CommSupply** **Booth 128**
*Existing products*
Microwave and conventional antenna systems; towers; coaxial cable and accessories; site management equipment; mobile and fixed wireless solutions; and test and measurement devices.
*New products*
Bluewave premium quality antennas and peripherals; NexTek Sureguard coaxial surge protectors.

**Air Comm** **Booth 953**
*Existing products*
Reconditioned Motorola two-way radios and accessory items; "new old stock" equipment on an "as available" basis from other manufacturers.

**Alexander Technologies** **Booth 537**
*Existing products*
Two-way radio batteries; mobile mount chargers for two-way radio batteries; chargers and battery analyzers.
*New products*
ATI200 versatile battery charger; mobile mount chargers—CH0202, CH8294, CH56217, CH340, CH700P.

**Allcom Products** **Booth 1072**
*Existing products*
Lightning suppression products; coaxial cable assemblies; wiring and power harnesses.

**Amrel Systems** **Booth 881**
*Existing products*
Rocky II+.

**Antenex** **Booth 1044**
*Existing products*
Mobile, base and portable antennas; patented Phantom antennas and accessories.
*New products*
2.4GHz omni and yagi; tunable VHF Phantom; new catalog.

**Antenna Plus** **Booth 581**
*Existing products*
Low-profile antennas.
*New products*
Model AP1540 low profile VHF antenna.

**Antenna Specialists** **Booth 725**
*Existing products*
Mosaic, LMR antennas; Homelink, PCS in-building antenna kit; EAC-50, in-building repeater kit; dual-band rooftop and magnet mount antennas; subscriber fixed-station planar, yagi and omnidirectional antennas.
*New products*
ASPA1860TGPS, Tele-locator 800MHz/GPS antenna; APDM928, 3dB gain on-glass dual-band cellular/PCS antenna; APDM927, economy on-glass dual-band cellular/PCS antenna; ASPG1860TGPS, Tele-locator 900MHz/GPS antenna.

**AOR USA** **Booth 1267**
*Existing products*
Radio communications receiver; surveillance receiver; wireless video communications module.
*New products*
Model SR1050 surveillance receiver.

**APCO International** **Booth 370**
*Existing products*
APCO International AFC, a spectrum-management leader, is FCC-certified to provide frequency coordination and telecommunications services to your community.
*New products*
67th Annual APCO Conference & Exposition; APCO Institute's 2001 class schedule; APCO International's 2001 symposium series information.

**A+R Telecom** **Booth 987**
*Existing products*
Seismic relay racks; ladder cabling systems; batteries; battery tray; dc power plants; cable assemblies.
*New products*
Sensorguard BG 2000; Marconi power systems.

**Avtec** **Booth 342**
*Existing products*
DSPatch series of integrated radio/telephone console systems with color touchscreen operation.
*New products*
DSPatch base station controller with packet voice operation and dial back-up; leased circuit with dial back-up; dial-up circuit; digital voice base station radios.

**Atlantic Scientific** **Booth 586**
*Existing products*
Tower light protectors; Zonemaster series; cabinets.
*New products*
Tower light protectors.

**Bearcom Wireless** **Booth 1170**
*Existing products*
Nextel product lines; full Motorola product line; ICOM America product line; EF Johnson Smartnet and Smartzone products.

**Buzzeo** **Booth 693**
*Existing products*
Zeo Wireless Workflow, Java-based programmers kit.

**BYD America** **Booth 588**
*Existing products*
NiCd rechargeable batteries; NiMH rechargeable batteries; Li-ion rechargeable batteries.
*New products*
NiCd rechargeable batteries; NiMH rechargeable batteries; Li-ion rechargeable batteries.

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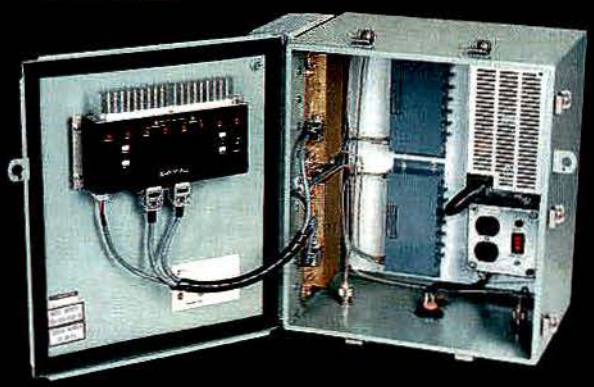

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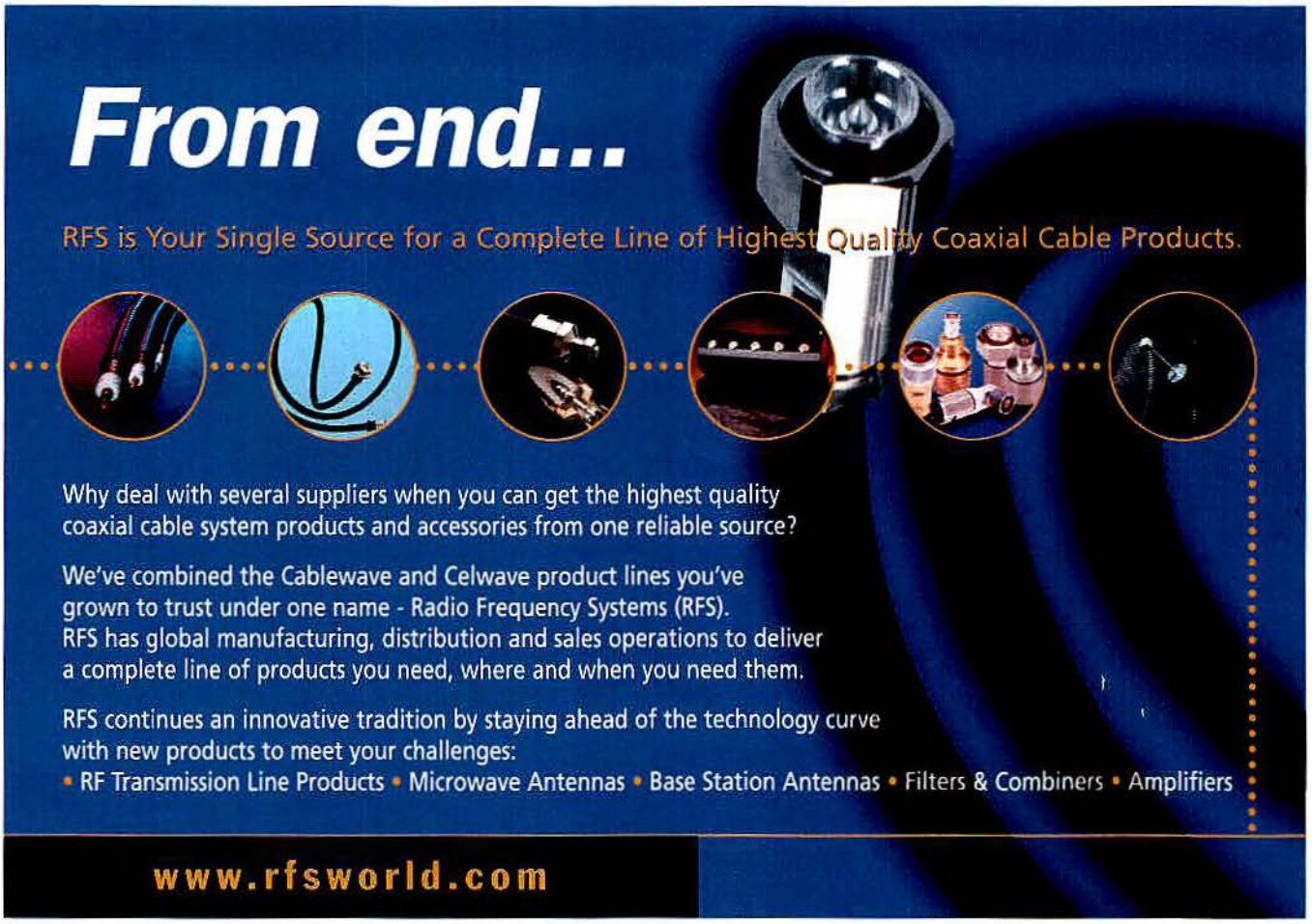



CIRCLE (42) ON FAST FACT CARD

**Childs Antennas** **Booth 556**
*Existing products*
Mobile, portable and base antennas for two-way radio.
*New products*
A new line of injection-molded portable radio antennas for SMA-type radios.

**Computer Resources** **Booth 508**
*Existing products*
Billing and provisioning for IDEN and Harmony Wireless; software for mobile radio billing, service management, sales management, inventory/purchasing, accounts receivable, accounts payable, rental management, general ledger, recurring billing; Motorola conventional trunked radio management (MRIDA/MRISM).

**Comtelco** **Booth 1131**
*Existing products*
XL series base station antennas; classic series mobile antennas; Y22 and Y33 series yagi antennas; low-profile mobile antennas; A26 and A25 series panel antennas.
*New products*
A26 series antennas for voice and data.

**CPI Communications** **Booth 564**
*Existing products*
DR series dc remotes; MR/DTP series dc panels; LE series local extensions; TR series tone remotes; TTP/MR series tone panels; MCR/TSR series multichannel products; MCP/TSP series term panels; DTCI dc-to-tone converter; SV/RST series satellite products.
*New products*
TTP200 series tone panels; TR multifrequency tone remotes; MCR411A 90 series Kenwood remotes; TSR412A 80 series Kenwood remotes; MCR200 Motorola Com series remotes.

**CSI Shelter Technologies** **Booth 886**
*Existing products*
Turnkey precast, concrete modular telecommunications building in 8', 9', 10' and 12' wide designs.
*New products*
Micro 916; Micro 11620 buildings.

**CVDS** **Booth 156**
*Existing products*
ComLog, digital voice recorder.

**D & R Electronics** **Booth 786**
*Existing products*
In-vehicle computer mounting products; radio equipment consoles; trunk-mounted mobile equipment mounting tray; emergency vehicle electronics—light/siren control systems; emergency lighting; switch panels.

**Daniels Electronics** **Booth 1143**
*Existing products*
MT-3 series radio repeaters and base stations (29MHz–960MHz) for portable, fixed and transportable systems.
*New products*
P25 digital repeaters and base stations (Daniels MT-4 series radio systems); modular VHF lowband repeaters and base stations.

**Dantherm HMS** **Booth 1180**
*Existing products*
Escalade wall-mount air conditioner; Classic air conditioners; Pinnacle heat exchanger.

**Data Comm for Business** **Booth 364**
*Existing products*
Access switch, remote access device;

broadcast polling FRAD, frame relay access device; APS-01, remote ac power control; SRVM.

**Dataradio** **Booth 405**
*New products*
Gemini 25.6kHz RF data modem.

**Datron World Communications** **Booth 1248**
*Existing products*
TW7000, 1.6MHz–30MHz, 125W transceiver; TW500D and TW100D, 500W/1kW amplifiers with remote control; network management and data messaging software.
*New products*
Spectre VR, 30MHz–88MHz VHF/FM tactical manpack radio family; PC1100 30MHz–88MHz hand-held radio; Guardian, 256-channel VHF Project 25-compliant G25RPV100 portable and G25RMV1000 mobile.

**David Clark** **Booth 444**
*Existing products*
Headset with PTT adapter cords for mobile and portable radios; voice-activated headsets for portable radios; headset intercom systems with two-way radio interface.
*New products*
TM-2 throat microphone; H6020 headset with shielded microphone.

**Decibel Products** **Booth 1329**
*Existing products*
DB810KE-XC 10dB omni antenna; ASP927 8.5dB Varitilt omni antenna; DB8062F 10-channel combiner.
*New products*
DB809KRR-XC 10dB offset omni antenna; DBD2702 DA tower-mounted amplifier; DBP2806 FA universal power distribution unit; DBA7584D06QT autotune combiner for ESMR.

**Digital Paging** **Booth 876**
*Existing products*
Fully synthesized, hand-programmable Apollo pagers. Available in all formats of VHF, UHF, 900MHz Flex/POCSAG.
*New products*
New alphanumeric pager.

**DriverTech/QSI** **Booth 1186**
*Existing products*
DI-2000 truck PC; truck PC load dispatch application; truck PC map navigation application; truck PC two-way message application.

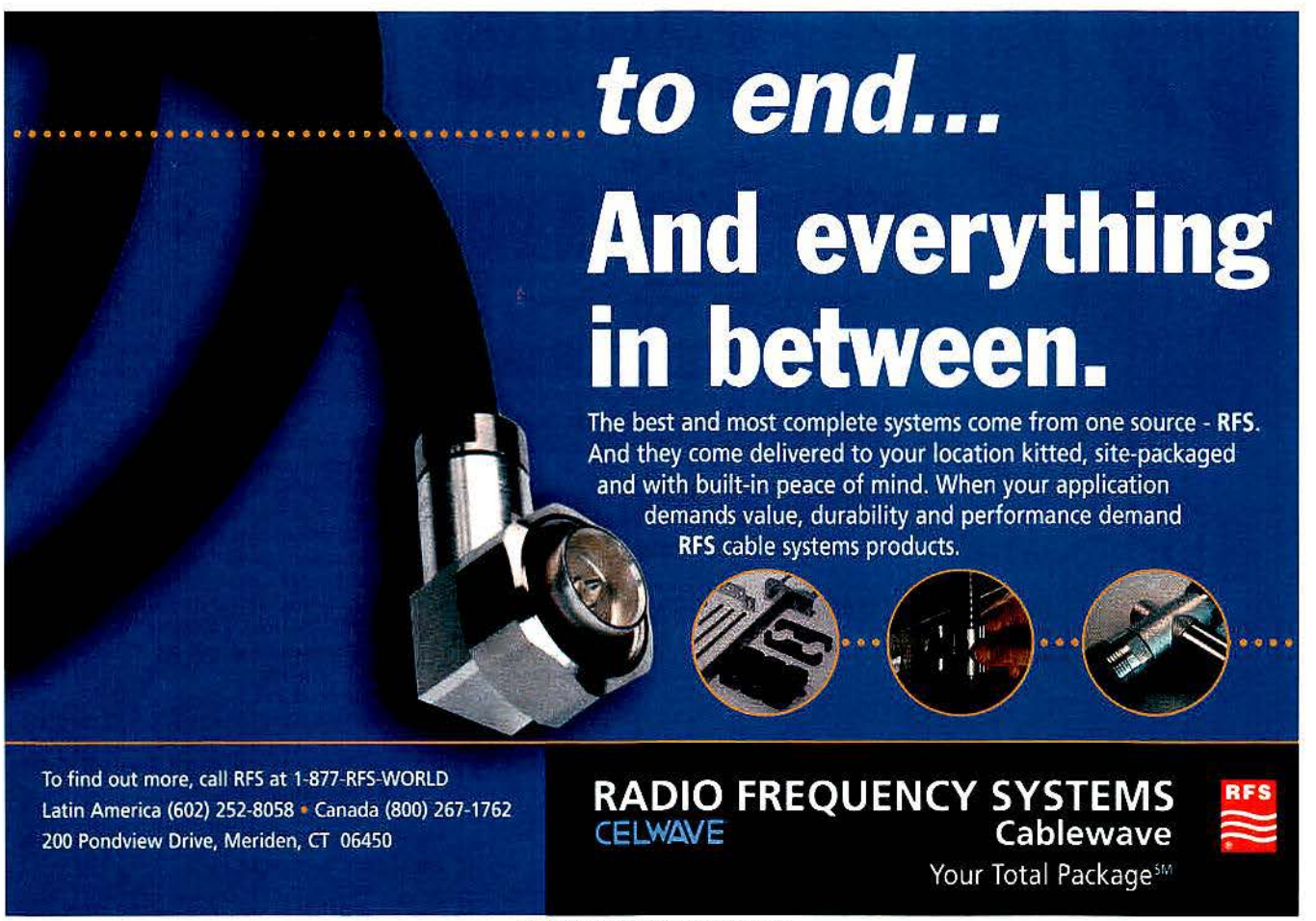
**Dyplex Communications** **Booth 980**
*Existing products*
Phonak microEar VHF; Phonak Phonito; Phonak Flex Loop.

**Earmark** **Booth 1276**
*Existing products*
Basemaster; 4C and 4S headsets; Beltpak; Flexpak; various headphones.

**Eartec** **Booth 1165**
*Existing products*
Heavy-duty double and single earmuff headset accessories for portable radios.
*New products*
The Monarch, a durable, lightweight double earmuff headset.

**EF Johnson** **Booth 715**
*Existing products*
Smartnet/Smartzone-compatible mobiles and portables; fixed land mobile radio transceivers; mobile and portable radios for use on APCO 16 and 25 trunked and conventional analog and digital radio systems and LTR-net trunking systems.

**Electro-comm** **Booth 112**
*Existing products*

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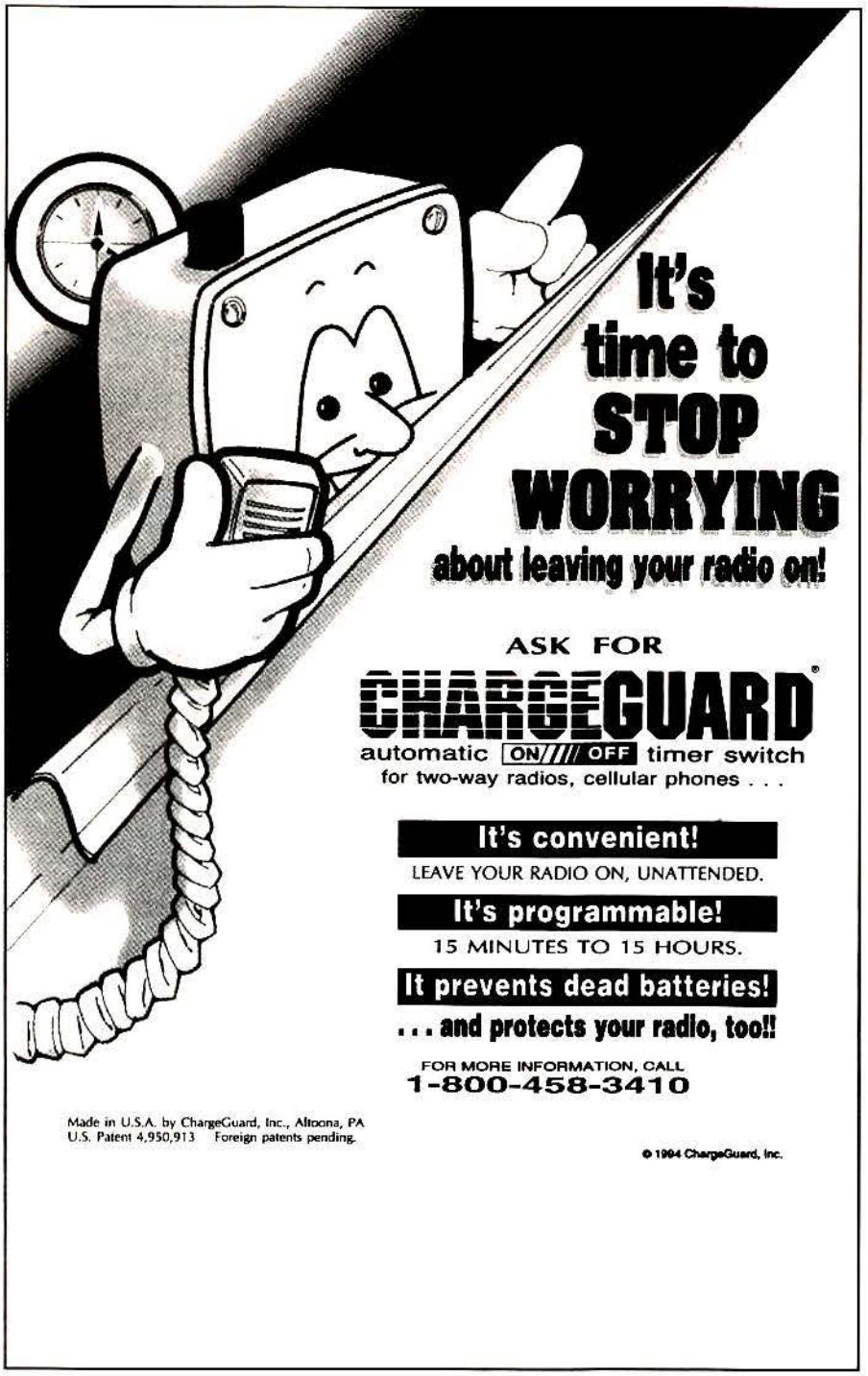
Stocking distributor of a wide variety of wireless accessories. Showing 2.4GHz broadband accessories and in-building RF distribution systems.

**EML** **Booth 242**
*Existing products*
Communications service monitors; calibration services.

**EMR** **Booth 1045**
*Existing products*
Transmit combiners; receive multicouplers; cavity resonators; duplexers; isolators; amplifiers.
*New products*
800MHz 40W power amplifier; low-cost dual pass notch cavities; three-four-channel low-profile hybrid combiner.




CIRCLE (43) ON FAST FACT CARD

**Eventide** **Booth 1219**
*Existing products*
Digital voice logging recorders and instant recall recorders.
*New products*
ArchiveReview Software; 9.4GB DVD-RAM drives; 36GB internal hard disks.

**Fibox Enclosures** **Booth 793**
*Existing products*
Corrosion-resistant enclosures in sizes from 2'×2'×1.5' up to 30'×22'×10'.
*New products*
MNX series of polycarbonate and ABS enclosures; CAB series of polycarbonate and ABS enclosures.

**Fibrebond** **Booth 1070**
*Existing products*
Concrete equipment shelters; equipment installation services; guyed and self-supported towers.

**Fryer's Tower Source** **Booth 574**
*Existing products*
*Tower Source Market Report; Fryer's Site Guide; Fryer's Tower Owner Buyer's Guide.*

**Futurecom Systems Group** **Booth 371**
*Existing products*
Sitexcom, channel selective RF repeaters; Chanexcom multiband line amplifiers; Mobexcom vehicular repeaters.

**Gabriel Electronics** **Booth 676**
*Existing products*
Solid parabolic and directional flat panel antennas for spread-spectrum band antennas operating in the 2.3GHz–2.5GHz and 5.25GHz–5.85GHz.

**GAI-Tronics** **Booth 137**
*Existing products*
Tone and dc remote desksets; trunking and local desksets; radio interface equipment; wireless emergency telephones.

**The Genesis Group** **Booth 1174**
*Existing products*
GenSZAI and NetVista, accumulation and reporting software for Motorola Smartzone systems; Ezbill, billing and management software for Motorola trunking systems; Ezsave, communications software for Motorola trunking; ExbilLTR and LTRsave, billing and management software for LTR and Passport trunking.
*New products*
Genesis Trio, state-of-the-art management, billing and provisioning software for Motorola's Harmony and IDEN digital trunking systems.

**Harger Lightning and Grounding** **Booth 486**
*Existing products*
Lightning protection equipment;

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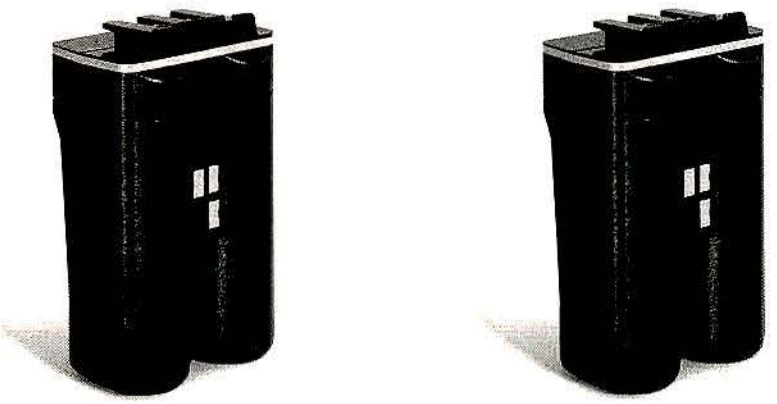

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grounding equipment.
*New products*
Ultraweld; Ultrafil.

**Harris Intraplex** **Booth 1308**
*Existing products*
Intraplex Crossconnect system & server; Intraplex access server

**Havis-Shields Equipment** **Booth 789**
*Existing products*
Trunk-mounted radio trays for Crown Vic (C-3190) and Impala (C-3311); dash-mount for Motorola 520 Mobile Workstation (C-3052-4); consolidator consoles, computer mounts, prisoner transport inserts, interior and exterior window guards, K-9 transport modules and emergency lighting.

**ICOM America** **Booth 501**
*Existing products*
Land mobile transceivers and application-specific communications equipment including portables, mobiles, repeaters, Passport-ready trunking subscriber units, wide-band scanners and receivers.
*New products*
IC-F30GS/GT VHF public safety portable; IC-F40GS/GT UHF public safety portables; IC-F21 UHF GMRS with 16 channels and 2W; IC-F21 two-channel UHF BRS, 2W; IC-F21 two- or 16-channel conventional-use UHF.

**IDA** **Booth 500**
*Existing products*
Trunking controllers; tone and digital remote controls; LTR conversion kits for Motorola radios; Trakit-AVL vehicle tracking system.
*New products*
Fleetsync Kencall; Fleetsync Trakit; digital base station kit.

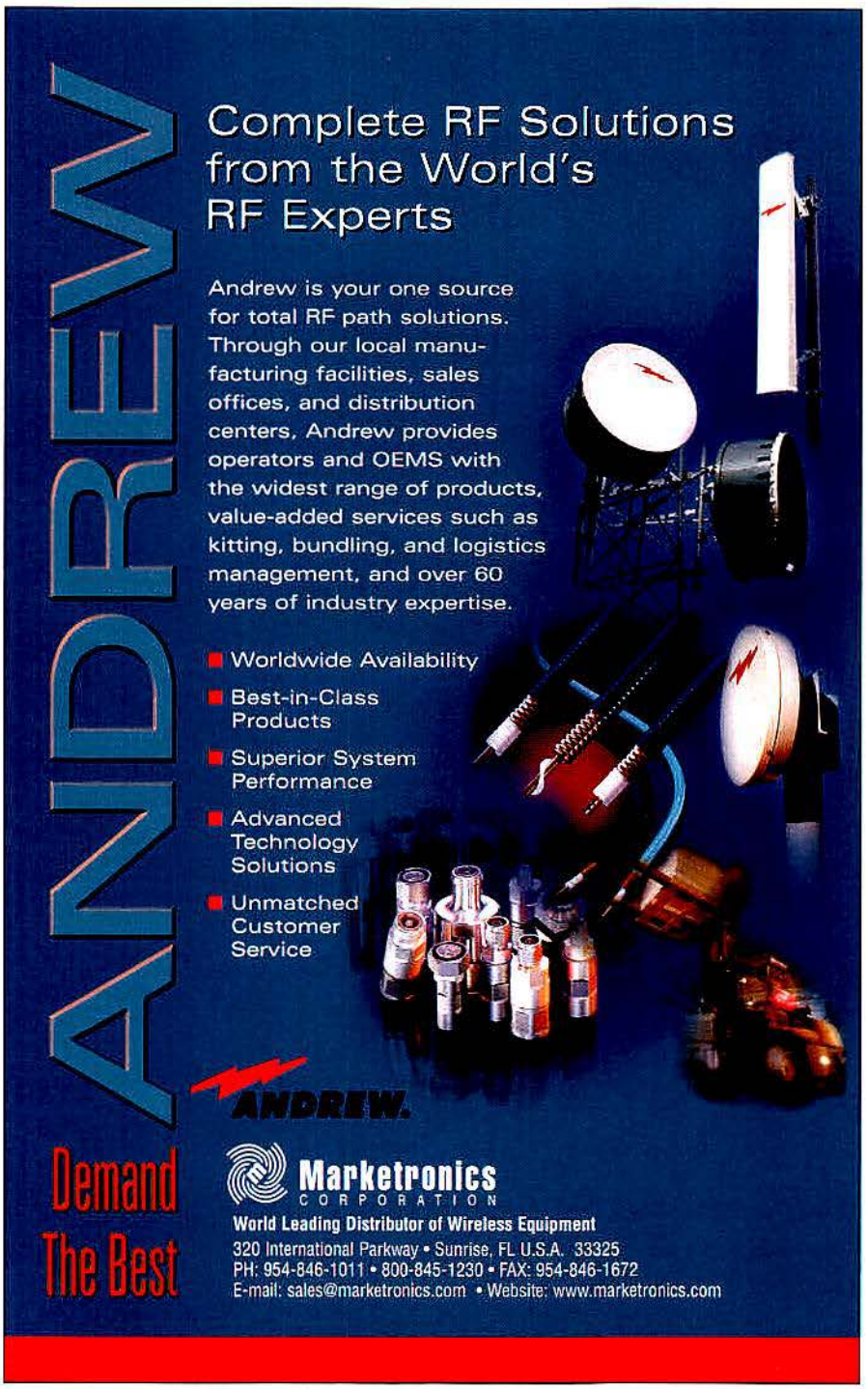
**iTech** **Booth 1312**
*Existing products*
BC350QC single-station charger; BC3503QC three-station charger; BC3506QP-5 six-station charger/analyzer/conditioner; BattTrak, battery performance recording software.
*New products*
IQpac, personal analyzer charger; IQpac, networked personal maintenance system.

**Kathrein, Scala Division** **Booth 611**
*Existing products*
AP series antennas for cellular and PCS; OG series base antennas for land mobile; CA series base antennas for land mobile.

**Lawson Software** **Booth 1074**
*Existing products*
Telecommunications software featuring activity-based management, integration with all OSS systems, ease of metrics reporting, Web-addressability, flexible software engines, open architecture and Web-based recruiting.

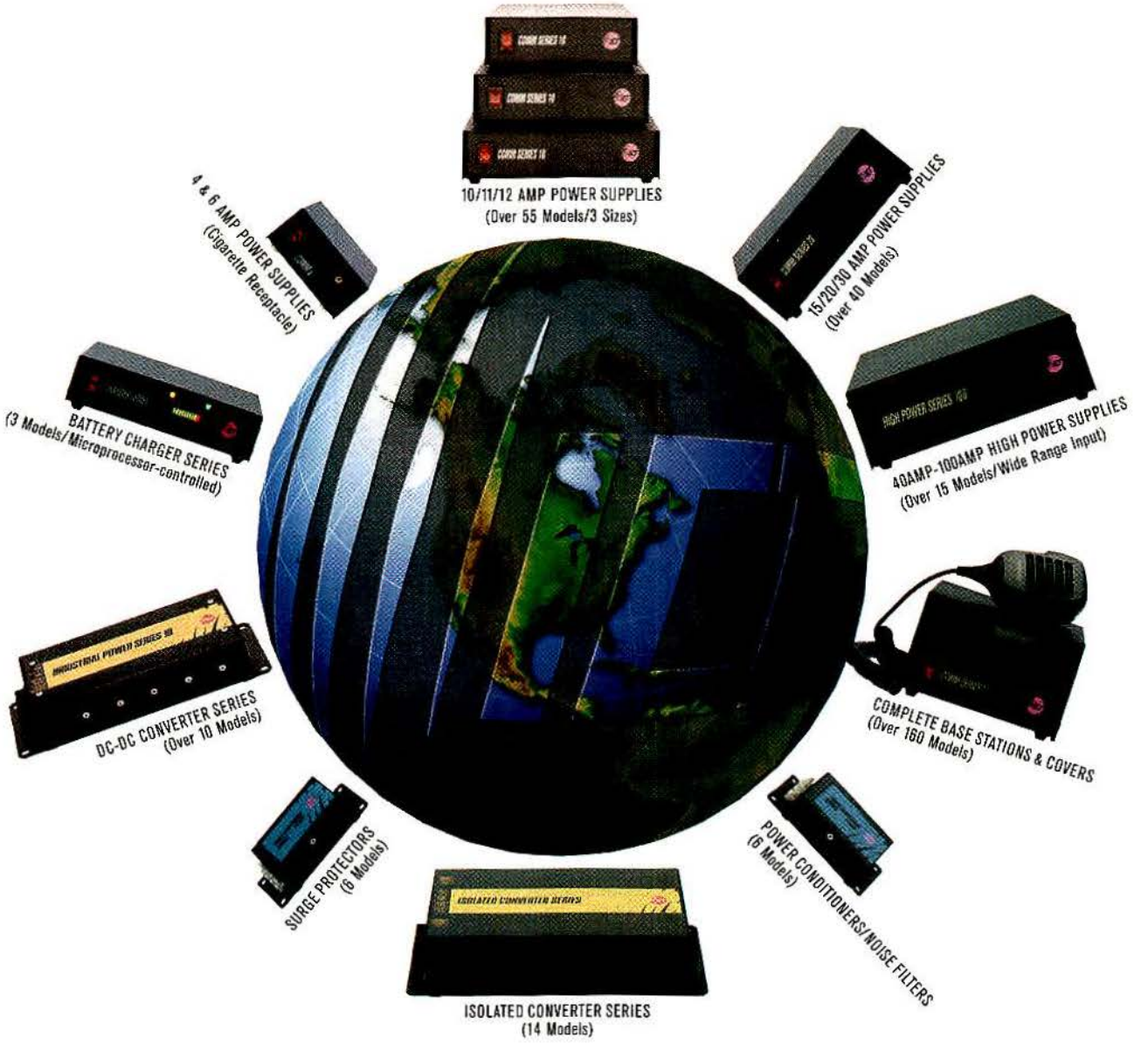
**Lease Acceptance** **Booth 1128**
*Existing products*
Finance/equipment lease programs.

**Link Communications** **Booth 1225**
*Existing products*
RLC-CLUB repeater and linking controller; CSM-1000 communications service monitor.
*New products*
Cellular Mate, dual-band cellular service monitor.

CIRCLE (45) ON FAST FACT CARD

# Get the Power.

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**Visit us at IWCE Booth #351**

**Marketronics** **Booth 1053**
*Existing products*
Two-way radio; antennas; batteries; filters; paging; power sources; test equipment; signaling; towers; cables; connectors; accessories.
*New products*
Motorola Pro 9150 portable.

**Marvair** **Booth 1086**
*Existing products*
Air conditioners and Crispaire environmental control units for cooling telecommunications shelters and cabinets.
*New products*
The Comstat 3 lead/lag controller for redundant air conditioners.

**Maxrad** **Booth 1119**
*Existing products*
Mobile antenna line for VHF, UHF, 800/900MHz and PCS frequencies; 2.4GHz wireless data antenna line; directional and omnidirectional antenna lines for frequencies from VHF to PCS.
*New products*
MSP sector panel antennas for ISM, MDS and WCS frequencies; MC antenna series for wireless indoor communications in 800/900MHz, PCS and 2.4GHz ISM frequencies; 2.4GHz ISM antennas for mobile and fixed applications.

**Mentor Engineering** **Booth 577**
*Existing products*
Mobile data computer; Mobiconnect Modem; XGate Middleware.

**Metric Systems** **Booth 471**
*Existing products*
Mavric 2000nx, ethernet/IP enterprise networking router/controller; Mavric Explorer II, ethernet/IP enterprise networking router/controller.
*New products*
Ramm 2000, all-weather transceiver antenna system.

**Microwave Data Systems** **Booth 780**
*Existing products*
MDS LEDR 900S; MDS LEDR 400S; MDS LEDR 1400S; MDS LEDR 400F; MDS LEDR 1400F.

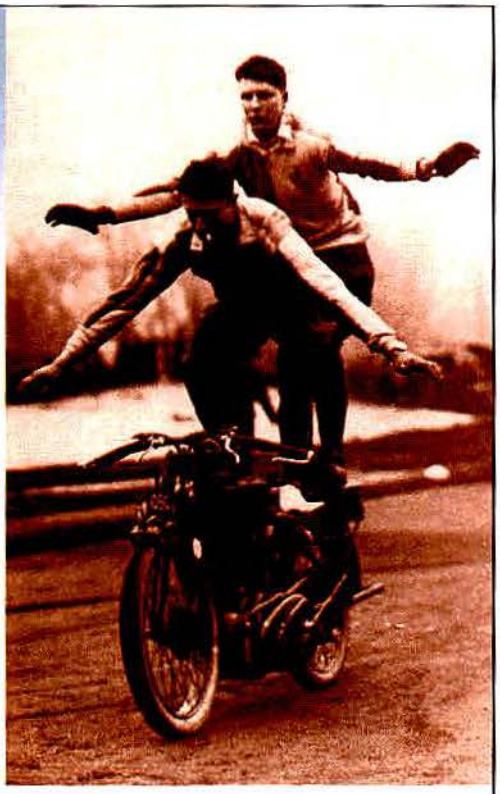
**Midian Electronics** **Booth 417**
*Existing products*
TVS-2 series encryption; UED series encoders/decoders; ANI-M series; burst tone; CTCSS/DCS; remote control, VPU series encryption.
*New products*
TVS-2 TAIT; MOT-VPU-PRO; DDU series decoders.

**MTS Wireless Components** **Booth 1125**
*Existing products*
Bracket Master antenna mounts; ICECO accessories; Waveguide bridge components; site-related hardware and components.
*New products*
Universal modular equipment platform.

**Multiplier** **Booth 931**
*Existing products*
Replacement batteries for two-way and cellular: Kenwood TK-250/350/353 and Kenwood TK-260/270/360/370.
*New products*
Batteries for Motorola HT750/1250/1500 and GP320/340/360/380 radios.

**Narda Safety Test Solutions** **Booth 991**
*Existing products*
8700 and EMR series of RF survey


WHEN STABILITY COUNTS



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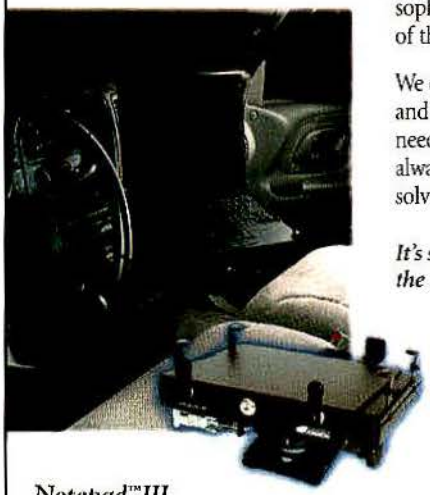

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IWCE Booth 821

equipment.
*New products*
ESM and 8600 series of wearable RF monitors; Radman XT and Nardalert XT personal RF monitors.

**National Law Enforcement & Corrections Technology Center/NIJ** **Booth 1319**
*Existing products*
Publications related to public safety technology, including the guide "Understanding Wireless Communications in Public Safety."

**Newmar** **Booth 415**
*Existing products*
Dc power systems; rackmount power modules; hot swap power shelves; dc-to-dc converters; low-voltage disconnects; meter panels; integrated power systems with built-in back-up batteries; complete power rack assemblies with all necessary power accessories, custom configured to site requirements.
*New products*
DST-20A rack power distribution panel with plug-in circuit breakers.

**Northpoint Communications Products** **Booth 143**
*Existing products*
Lopro, low-profile antennas (UHF, cellular, SMR, PCS, ISM and GPS).
*New products*
Lopro NP15000, amplified GPS antennas.

**Optoelectronics** **Booth 1237**
*Existing products*
Frequency counters; tone decoders; nearfield receivers; digital counters; test and measurement equipment.
*New products*
Digital Scout; Multicounter DC100.

**Orbacom Communications Integrator** **Booth 323**
*Existing products*
Genisis CAD/RMS.
*New products*
CAD/data/mapping interfaces.

**PageTek** **Booth 142**
*Existing products*
Jr. remote site monitor; 24+ expandable remote site monitor; Protektor mini-monitor; Gatekeeper site access control system; Sitemanager alarm management software.
*New products*
Protektor + IP.

**Peltor Communications** **Booth 887**
*Existing products*
H79 series noise attenuating headsets; Y2000 emergency vehicle systems; MT series communications headsets.
*New products*
Y2000 vehicle intercom systems; Powercom, self-contained transmitting headsets.

**Penta** **Booth 108**
*Existing products*
Integrated radio and telephone control systems; touch-screen dispatch consoles' remote base station controller; telephone interconnects; remote radio controllers.
*New products*
Baselink; Wavwriter; UPC signal controller; SLX dispatch console.

**PCIA** **Booth 170**
*Existing products*


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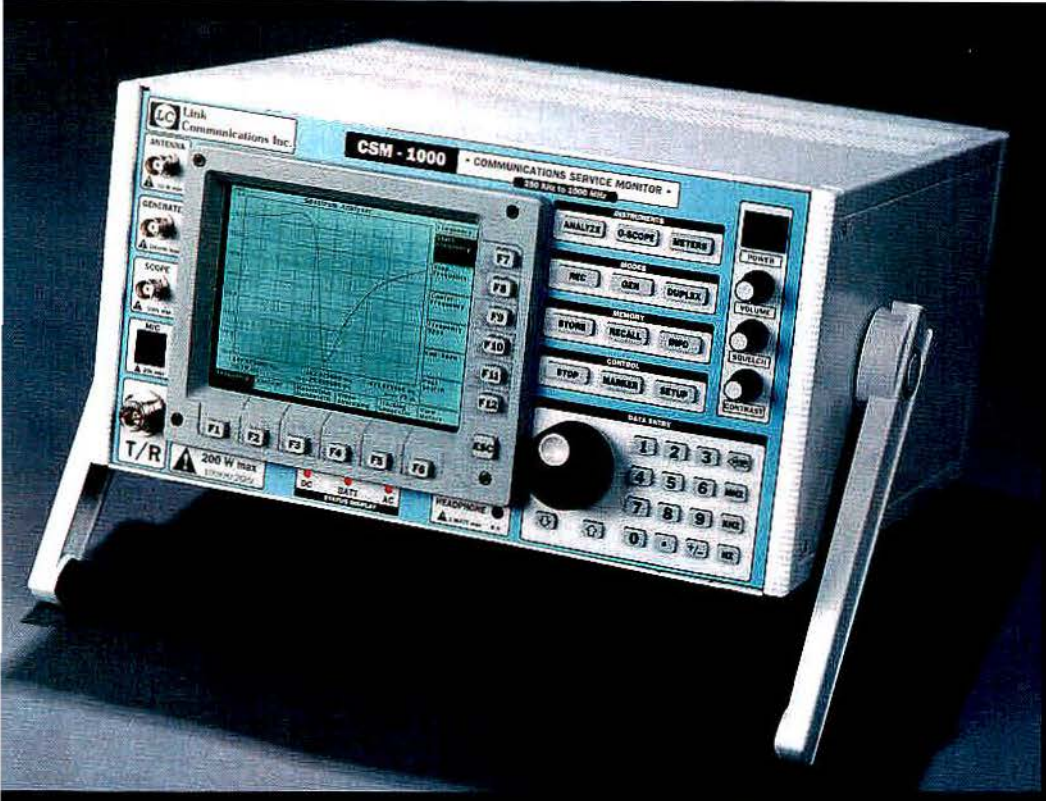


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Frequency coordination services.

**Power Products Unlimited** **Booth 981**

*Existing products*
Rechargeable batteries for two-way radios and accessories for cellular phones; NiMH versions of two-way radio batteries.

*New products*
BP9009, 2100mAh NiMH battery for HT750 radios; BP8299MHUC, 4000mAh NiMH battery for XTS3000 radios; EMP200, earphone/mic with PTT for two-way radios; SMP300, heavy-duty shoulder mic for two-way radios.

**Primus Electronics** **Booth 1124**

*Existing products*
Cable; connectors; mobile and base station antennas; lightning protection; tower products and accessories; power supplies; amplifiers; batteries; cable assemblies.

**Racal Communications** **Booth 252**

*Existing products*
Racal 25 digital portable radio; AN/PRC 148 digital portable radio.

**Racing Electronics** **Booth 1135**

*Existing products*
Headsets; car harnesses; helmet mics; PPT and earpieces to fit your radios.

*New products*
Racetrac titanium, quiet-talk headset; Comtools, speakermic.

**Radiall/Larsen Antenna Technologies** **Booth 401**

*Existing products*
Portable, terminal, mobile and small base antenna designs for frequencies from 27MHz to 5.8GHz.

*New products*
GPSDM series direct-mount GPS antenna; GPSNMO series NMO mount GPS antenna; SPDA series center-fed dipole portable antennas with 90° articulated connectors; LP150NMO low profile VHF mobile antenna; R380 500 104 table-top dipole antenna.

**Radiofrequency Safety International** **Booth 1252**

*Existing products*
Custom safety programs; FCC/OSHA/EPA compliance assistance; maximum permissible exposure evaluations; hazard assessments and reports; public training seminars; custom in-house training; RF hazard signs.

*New products*
"2001 RF and General Safety Training Odyssey," a tour of RSI's "RF Site Safety Awareness" and "RF Train and Trainer" public seminars in select cities throughout the United States.

***RadioResource* Magazine** **Booth 224**

*Existing products*
*RadioResource* magazine; "Public Safety Report"; *RadioResource International*.

**RadioSoft** **Booth 687**

*Existing products*
ComStudy 2.2; Frequency Finder; Radio Forms; Data Finder.

*New products*
Radio Forms; Data Finder.

**Raine** **Booth 1075**

*Existing products*
Nylon two-way radio cases, cellphone cases and pager cases.

*New products*


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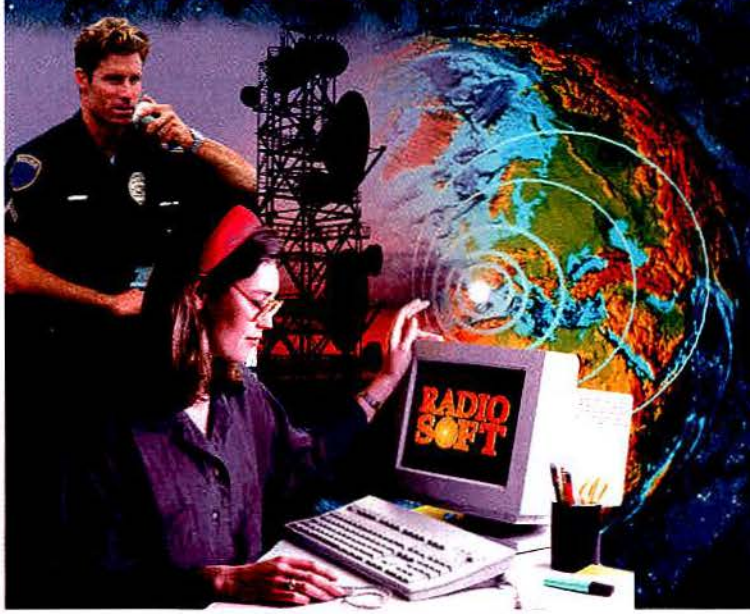


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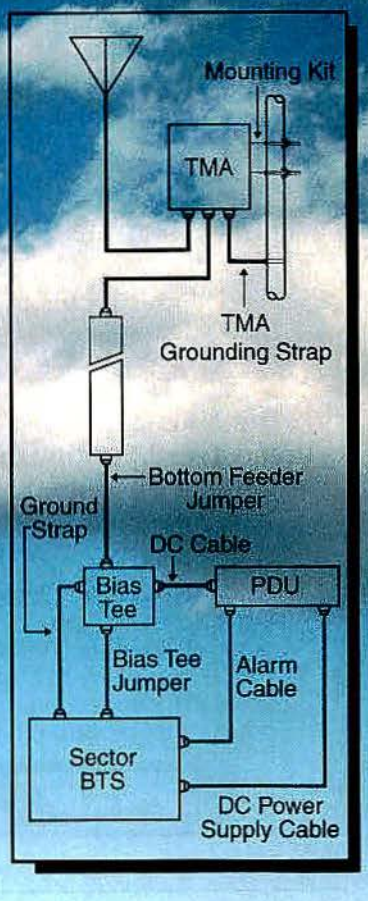


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ISO 9001

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***RCR Wireless News*** **Booth 565**
*Existing products*
Wireless industry trade publications.

**RF Connectors** **Booth 955**
*Existing products*
Complete line of coaxial connectors including BNC, TNC, N, Mini-UHF, MB, SMA, SMB, 7/16 DIN, MCX, EMR, corrugated and UHF. Product line also includes cable assemblies and crimp tool kits.
*New products*
Reverse polarity/gender (RP-3001, RP-3001-B) and reverse thread connectors (RT-1211, RT-1208); new 7/16 DIN series connectors (RFD-1631-2L2, RFD-1604-2L2); expansion of cable assembly standard offerings.

**RF Imaging and Comm** **Booth 466**
*Existing products*
Used radio communications service and general test equipment from HP, IFR, Motorola, Marconi, Stabilock, Cushman, Wavetek; cellular test equipment; PCS test equipment.
*New products*
Protek 2GHz RF field analyzer 3201; Rubidium frequency standards, Model FE-5680A.

**Ritron** **Booth 936 & 943**
*Existing products*
Patriot conventional portables; Patriot UHF trunking portables; Patriot repeaters; Patriot mobiles; Quick Talk series and RF telemetry; Jobcom portables and base station/mobiles.
*New products*
Jocom 4 series portables, JMX 141/144/146/444/446; Patriot 4 series portables, SST 141/144/442/444.

**Sabre Communications** **Booth 787**
*Existing products*
Guyed and self-supporting towers, monopoles and HF antennas. Tower structural analysis, turnkey construction, tower inspection and project management.

**Satel Oy** **Booth 379**
*Existing products*
Satelline 3ASd; Satelline 3AS.
*New products*
Satelline 3AS Epic.

**SCA** **Booth 264**
*Existing products*
SPAV01 VHF tone and voice pager; SPAV02 UHF tone and voice pager; SPAV03 VHF low-tone and voice pager.

**Scientific Dimensions** **Booth 1121**
*Existing products*

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Mobile mounting equipment for voice and data communications devices. Mobile radio slide mounts; heavy-duty pedestal mounts; police console mounts; mobile office workstations; vehicle computer docking station systems and mobile office accessories.
*New products*
SDI 7278, universal computer cradle; SDI 7280, Getac A320 computer docking station; SDI 7239 seat belt computer mount.

**SEA** **Booth 427**
*Existing products*
ESP 504 and ESP 520 radio transceivers; ESP 520DX DSP mobile data transceiver; ESP 700 narrowband portable radio; ESP 604 DSP-based mobile radio; ESP 1000 and ESP 11000 DSP repeater/base stations.

**Securicor Wireless** **Booth 642**
*Existing products*
Titan mobile radio; Bantam portable radios; Titan base/repeaters; Lincar modulation communications system; Titan vehicular repeaters.
*New products*
70-0671B&C and 70-0511B&C Titan mobiles; 70-160B and 70-260B portables; 70-162B portable; 71-0150B/C, 71-3050B, 71-4050B Titan base/repeater; 70-112B portable; 70-2945 Titan vehicular repeater.

**Setcom** **Booth 465**
*Existing products*
Portable and mobile headsets; portable and mobile helmet kits; vehicular/intercom radio mixers; police motorcycle comkits; police bicycle comkits.

**Shure Communications** **Booth 773**
*Existing products*
Modulink system mics; 810 speaker microphone; Gooseneck mics.

**Simulcast Solutions** **Booth 1042**
*Existing products*
Spectrum Master oscillators; JPS voter comparators; Convex delay and equalization subsystems; Intraplex multiplexers and T1 GPS alignment.
*New products*
Dalman technical services; Cosmos 4 and Solar GPS aligned single-channel audio control.

**Sinclair Technologies** **Booth 959**
*Existing products*
SRL series of yagi antennas; MR series of mobile duplexers; Excaliber mobile antenna family; panel antennas; and combine bandpass duplexers.
*New products*
RM480008-G16-502-DUAL NPCS receiver multicoupler 901–902MHz; PD8-E3332 eight-way power divider 800MHz–2,500MHz.

**SmartLink Development Network** **Booth 1033**
*Existing products*
Multipoint and frequency-transparent real-time networking system (SmartLink); single-site, multiprotocol trunking system; Sitelink digital multiplexer and linking equipment.
*New products*
SMRLink system with Smartrunk and LTR-Net enhanced protocols.

**SoftWright** **Booth 228**
*Existing products*
Terrain Analysis Package version 4.3 for Windows 95/98/NT.
*New products*
Autopath.

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**Sonik Technologies** **Booth 1325**
*Existing products*
PTX digital paging transmitters, Pagepro transmitters, Pagelink paging data receivers, Skyline wireless modems; Datalink transceivers.
*New products*
Combine narrowband UHF transceivers.

**Southwest PV Systems** **Booth 1286**
*Existing products*
Solarex solar modules; Solarex "SX" series of solar modules; systems components that include regulators, batteries, battery enclosures and mounting hardware.

**SpaceCom Systems** **Booth 691**
*Existing products*
Uplinking of video, data and audio transmissions. Satellite network includes redundant teleports and satellites for a secure signal.
*New products*
Deployment of two-way interactive satellite services for establishing connectivity during disaster recovery, bypass of local communications infrastructure or establishment of high-speed connectivity to remote sites.

**Stancil** **Booth 1317**
*Existing products*
Digital voice recorder and logger.
*New products*
e2Train Web-based training, pay-per-click.

**TAD Radio of Canada** **Booth 1120**
*Existing products*
TAD M10 VHF two-way radio telephone, microphones; TAD portable VHF radio telephones; Smartcom VHF and UHF two-way portable radio telephones.
*New products*
Smartcom VHF and UHF two-way portable radio telephones.

**Talley Communications** **Booth 511**
*Existing products*
Bi-directional amplifiers; coaxial cable; (cable assemblies) connectors; RF filter products; lightning protection; microphones; power supplies; amplifiers; scanners; signaling products and test equipment.
*New products*
Products from Western Multiplex; Solar Solutions and 2.4GHz and 5.8GHz spread spectrum voice and data products.

**TCC Industries** **Booth 461**
*Existing products*
AC/dc power supplies for cellphones; lead acid batteries; Talkaway Handsfree; pedestal mount, mini-mount and full line of coaxial connectors include N, TNC, Mini UHF, BNC, UHF, SMA, SMB, FME (SAP) reverse-polarity connectors, 7/16 DIN, adaptors and tools.

**TEKK** **Booth 558**
*Existing products*
NT series synthesized hand-helds (UHF, VHF); Pro series crytalled hand-helds (VHF, UHF); Pro Sport FRS radios.
*New products*
NT-90 UHF hand-held with voice scrambling option; NS series 2.4GHz wireless LAN products; SD-4000 synthesized data/telemetry radio.

**Telemobile** **Booth 1024**
*Existing products*
Wireless rural telephony; UHF and VHF systems, 136MHz–520MHz; wire-


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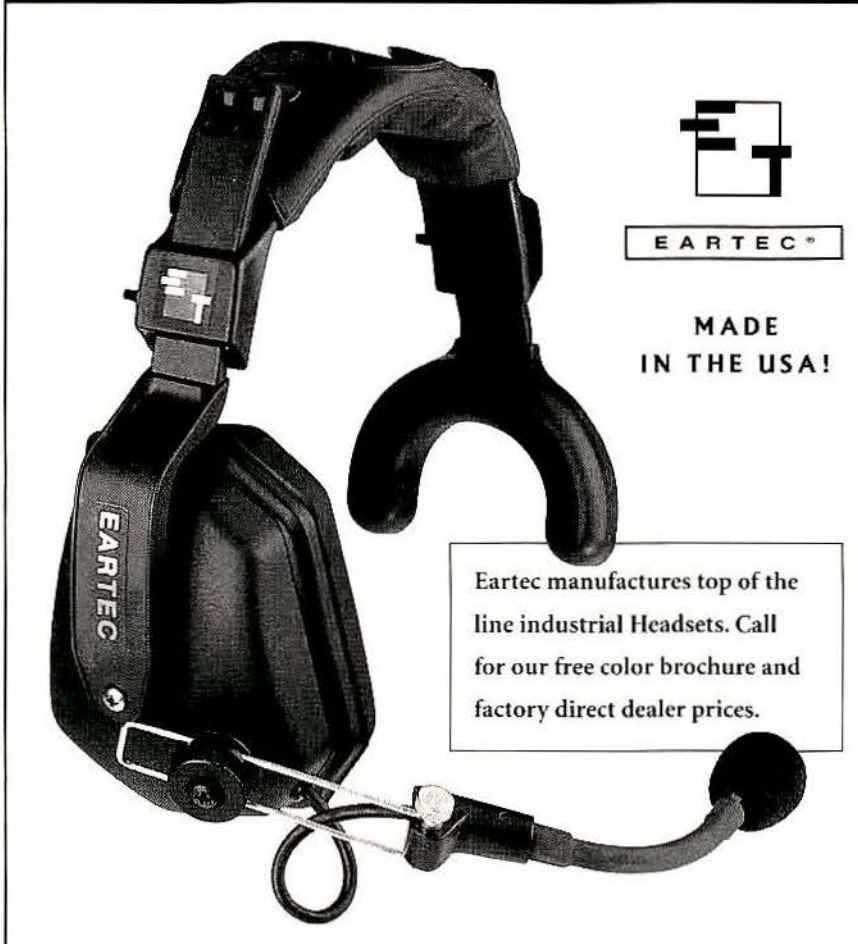


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less village telecenter; community telecenters; point-to-point systems; point-to-multipoint systems.
*New products*
Ultra-slim rack mount systems.

**Telex Communications** **Booth 1001**
*Existing products*
Vega models C-6124, C-1610, C-2000; wireless LAN antennas; land mobile headsets and ear microphones.
*New products*
C-2000 single-line tone remote console; model C-1610 six-line tone remote console; DSP-223 digital adapter panel; 5.8GHz antennas; headsets for SWAT tactical/bicycle communications systems and combat helmet.

**Teracom Connectors** **Booth 1318**
*Existing products*
Mobile and portable radio auxiliary equipment; coaxial connectors and accessories; antennas and antenna system accessories; PCS infrastructure; cables; power dividers/combiners.

**Times Microwave Systems** **Booth 359**
*Existing products*
LMR series cable; LLPL cable; DB cable.
*New products*
Test Mate; FBT.

**TPL Communications** **Booth 309**
*Existing products*
RF power amplifiers, VHF low band 35MHz–50MHz; high band 136MHz–175MHz; UHF 400MHz–512MHz; 806MHz–960MHz. Available in mobile, base station/repeater configurations.
*New products*
Series TMS 100W continuous duty amplifier for paging, trunking, base stations and repeaters; series BDA bi-directional amplifier; series RXH high-power amplifier for low band through 960MHz, up to 500W of output.

**Translectric** **Booth 1279**
*Existing products*
Servicemate SM2412-XX series dc-to-dc converters; Servicemate noise/spike filters; Servicemate memory modules.

**Trident Micro Systems** **Booth 821**
*Existing products*
TNT series of LTR controllers; Raider UHF trunking dispatch LTR controller; Marauder interconnect LTR controller; Tuff-Modem site modem.
*New products*
NTS network trunking system for the Passport trunking protocol; NTS dispatch console interface card; Tuff-Modem Plus site modem.

**Tru-Connector** **Booth 266**
*Existing products*
Coaxial connectors and cable assemblies in the following series: 7/16, N, LC, LT, EIA, QDS, C, SC, HN, BNC, TNC, SMA.
*New products*
New 7/16 coaxial panel jack.

**TX RX Systems** **Booth 449**
*Existing products*

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Base station antennas; multicouplers; signal boosters; tower-mounted preamplifiers; cavity filters; duplexers; RF system products.
*New products*
426-86A-01, smart backup tower-top amplifier; 42-05-01, VHF and UHF receiver multicoupler; 42-83A-01, 800/900MHz multicouplers; combline UHF preselector.

**United Communications** **Booth 976**
*Existing products*
In-house paging systems; Motorola pagers; family radio services (FRS); Peltor safety equipment; Audiovox cellphones.
*New products*
USAlert voice pagers.

**Universal Radio Products** **Booth 150**
*Existing products*
Universal CX, six-way rapid multicharge units and single-unit rapid charge units; two-way radio batteries.

**Vancomm** **Booth 116**
*Existing products*
Custom antenna mounts, brackets and systems; custom monopole and BTS platforms.

**VFP** **Booth 1330**
*Existing products*
Communications shelters for PCS, cellular, SMR, satellite, and microwave industries; power modules equipped with generators and switchgear.

**Wildgate Wireless** **Booth 506**
*Existing products*
Terminal switches for wireless industry; terminal switches for paging, cellular, PCS, GSM, unified messaging, one-number solution, faxes, long distance, local calling, Web connect and billing software, pagers, PDAs, one-way receivers for Handspring Visors.
*New products*
Wildmap switch; Web Connect; Digitrax billing package.

**Wireless Valley Communications** **Booth 1275**
*Existing products*
Siteplanner 2000; Palmfielder; LANFielder; Infielder; Wavespy; Predictor; Partsplanner; Optimatic; Sitespy.
*New products*
Palmfielder, PDA for design, deployment and asset management of wireless systems; Partsplanner, e-catalog authoring and direct marketing software.

**Wood & Douglas** **Booth 1339**
*Existing products*
Telemetry modules for integration by OEMs into domestic and export products (FCC and ETSI type-accepted) covering 130MHz–900MHz operation. Radio data modems. Simplex and duplex voice communications transceivers. Patch antennas. RF video link at L band and X band. Maxdaq building block 'plug and play' radio control and monitoring modules.
*New products*
Hermes 4LFSK radio data modem; G-Max ruggedized UHF radio transceiver.

**Z Technology** **Booth 579**
*Existing products*
S5000GPS series field strength measurement systems; R-500 series RF field strength meters.
*New products*
S5007GPS Windows-based field strength measurement system; S5010STR field strength measurement system . ■

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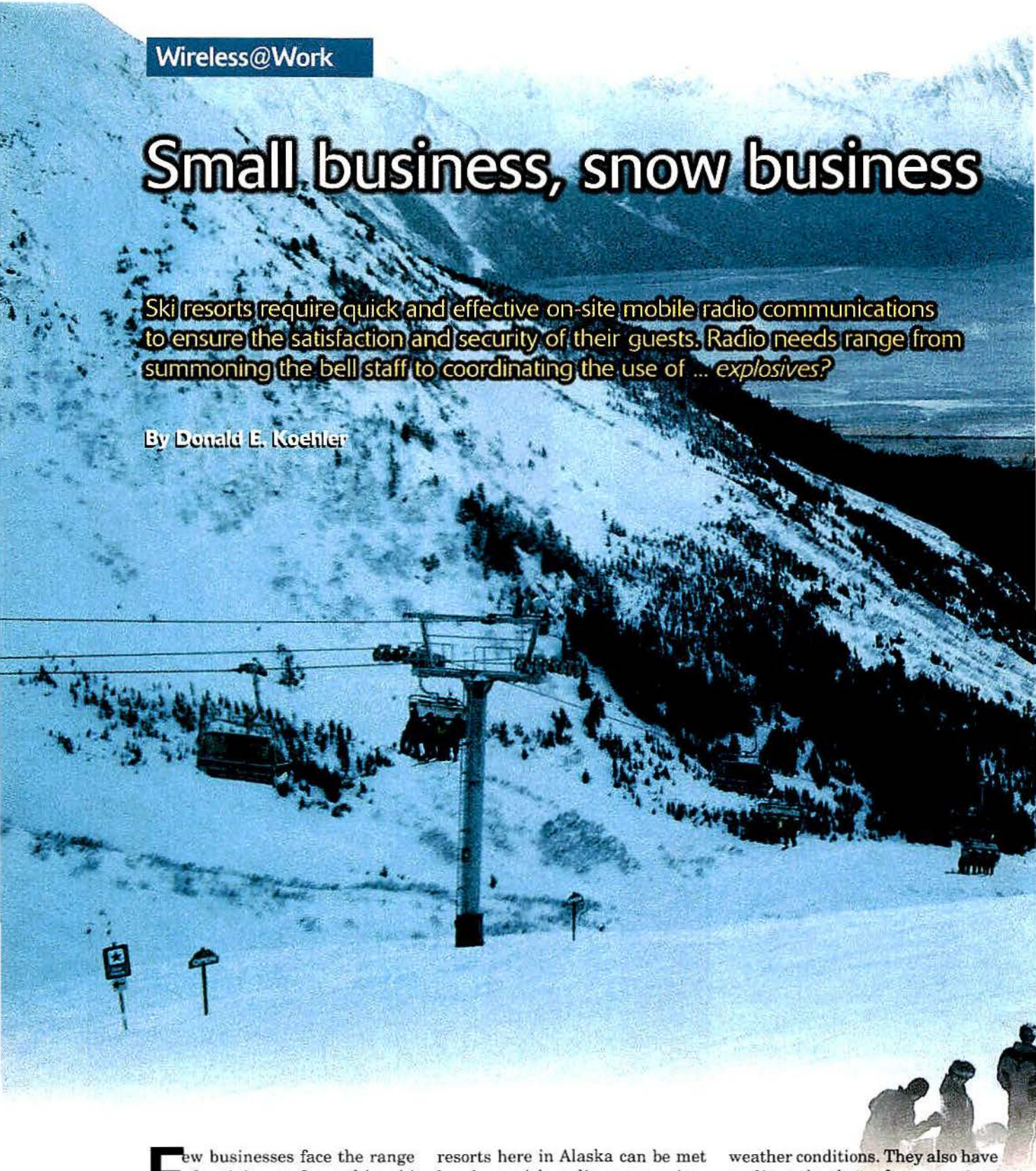
# Small business, snow business

**Ski resorts require quick and effective on-site mobile radio communications to ensure the satisfaction and security of their guests. Radio needs range from summoning the bell staff to coordinating the use of ... *explosives?***

By Donald E. Koehler

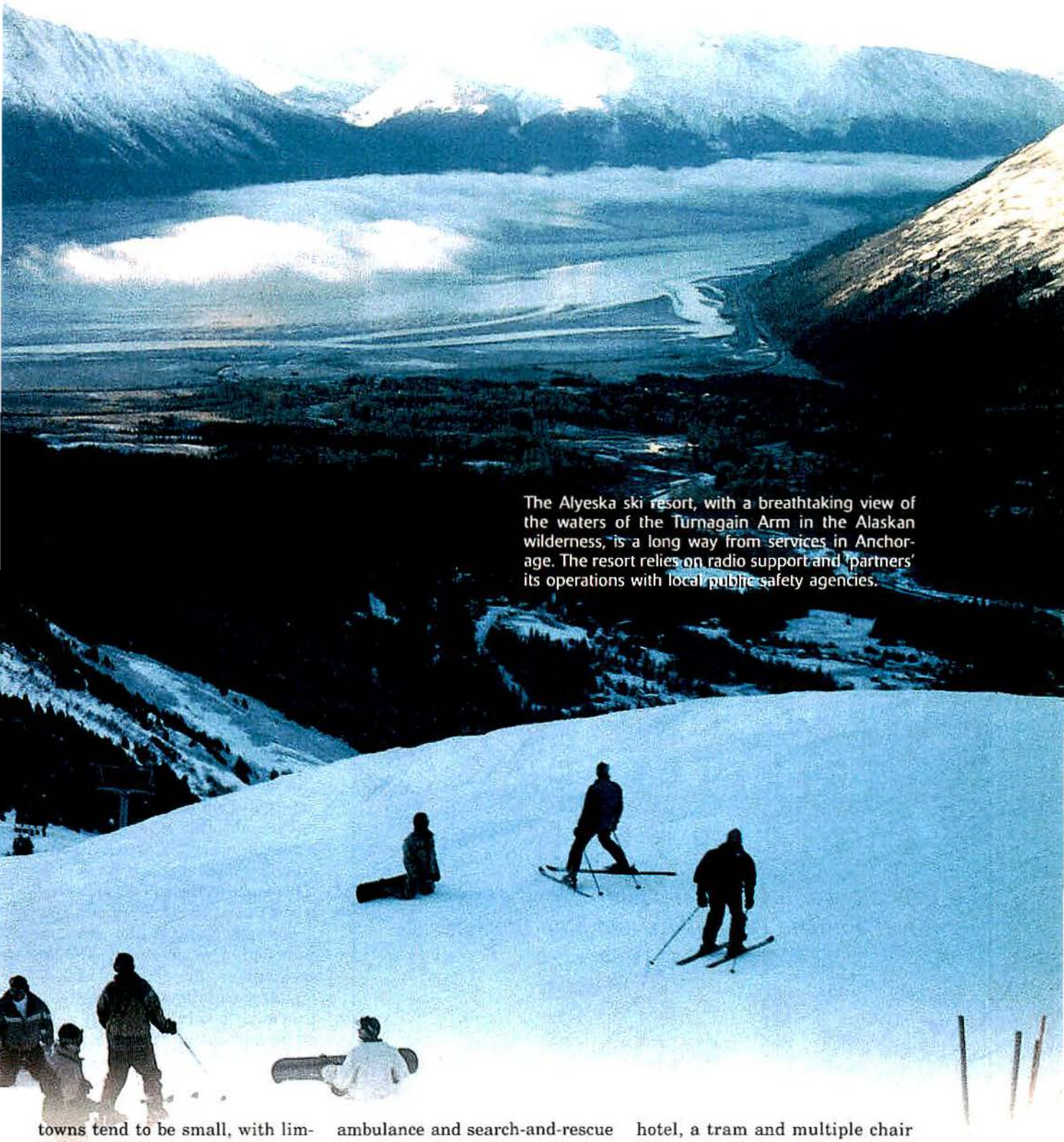


Few businesses face the range of activity confronted by ski resorts in the day-to-day operation of medium-to-large facilities. A ski facility manager's concerns run the gamut from industrial activity in tram-and-lift operations and snow making to resort issues like safety and security. The challenges faced by the resorts here in Alaska can be met head-on with radio communications solutions.

## Location, location, location

Most North American resort operations are located in mountainous terrain, so they must deal with periodic power outages, road blockages from avalanches and extreme weather conditions. They also have a clientele that often requires medical attention for everything from the sniffles to a leg broken on the black diamond run. Nearby

Contributing editor Koehler is a network operations manager at a major Alaskan communications corporation. His email address is AFDEK1@uaa.alaska.edu.



The Alyeska ski resort, with a breathtaking view of the waters of the Turnagain Arm in the Alaskan wilderness, is a long way from services in Anchorage. The resort relies on radio support and 'partners' its operations with local public safety agencies.

towns tend to be small, with limited resources. Any communications system should provide area-wide coverage, include all operational local public safety departments and ideally interface with state or local agencies that deal with roads.

Additional service coverage enabling communications with air ambulance and search-and-rescue groups completes this list of "must-have" radio system features.

The Alyeska ski resort operates one of the most extensive private (non-industrial) communications systems in Alaska. The resort is located in Girdwood, a small town south of Anchorage. The world-class facility supports a resort hotel, a tram and multiple chair lifts, and a ski area located in a narrow canyon off of the Turnagain arm.

The resort has a five-repeater trunked system manufacturered by Motorola, with four active machines and a control channel. This 800MHz system offers several advantages to the operators.

Providing site support to multiple public agencies, in addition to the resort's own radio needs, doesn't mean the roof profile has to be ugly. A cupola blends antennas with architecture.

Because of terrain features and a desire to support the local community, the upper tram station houses the repeater site and hosts radios from the local ham radio club and a system for the state of Alaska. This site provides service to a wide area, and it permits the local volunteer fire department, state road workers and troopers, as well as local hams, to communicate over an area notorious for road closures triggered by avalanches.

The upper tram station also houses a restaurant and a ski patrol headquarters, and it has both generator backup and UPS for critical systems. Because the winds often exceed 100mph, which can easily knock down power lines, this backup power adds another degree of confidence to an excellent system site.

The resort operates 16 talk groups over three fleets with 135 hand-held radios, 20 mobiles and three base stations. Each of the normal operations groups, such as ski patrol, snow safety, grooming, and tram and lift operators, has its own talk group.

Selected "super-users" have scanning features on their hand-held radios that allow them to communicate with all units.

Kurt Trayer, head of the ski patrol, said that radios are issued to individual workers, who are then responsible for charging, operator maintenance and turn-in for repair. Trayer said improved operator care had reduced battery problems. He also said the batteries last through a 12-hour shift because the operators follow proper procedures in charging.

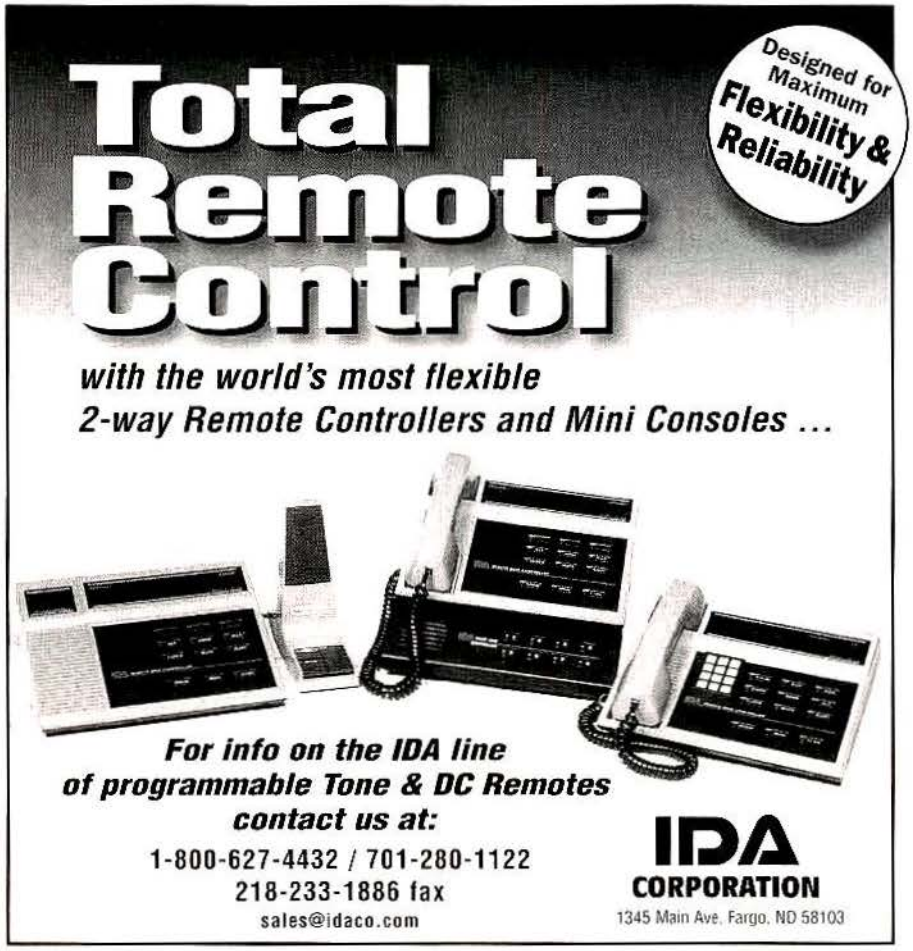
A tour of the mountain facility's snow-making operation reveals how essential the radio system is to this part of the resort. Thousands of gallons of water are pumped from a local creek and through a system of standpipes and hoses controlled by radio.

If resorts make snow when it's in short supply, then in times of abundance they get rid of extra white powder with a bang. Jim Kennedy, director of snow safety, and his crew control snow buildup with the use of explosives. Not many small businesses typically have this kind of firepower onsite. With 105mm howitzers and 106mm recoilless rifles, Kennedy and his expert avalanche-busters depend on the radio system to coordinate safety during explosive use.

The radio system itself provides a multilevel service. Access to state troopers on the resort base stations ensures the safety and security of these powerful cannons, and it provides positive interaction in the event of an emergency. The local volunteer fire department also makes use of the Alyeska system, providing a service to local residents and saving taxpayer funds in the process.

Additionally, the resort base stations work on the Alaska statewide EMS and emergency services frequencies. The resort also saves money by programming its own Motorola radios, and it works with the volunteer ski patrol group to ensure that its ICOM hand-held radios are correctly set.

Although the radios are programmed locally, repairs are handled out of state. Units are


CIRCLE (51) ON FAST FACT CARD

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shipped "outside" to a vendor and are typically returned within a week. Anchorage is a major air cargo hub, so having the radio repaired by a vendor with immediate access to spare or replacement parts makes good business sense.

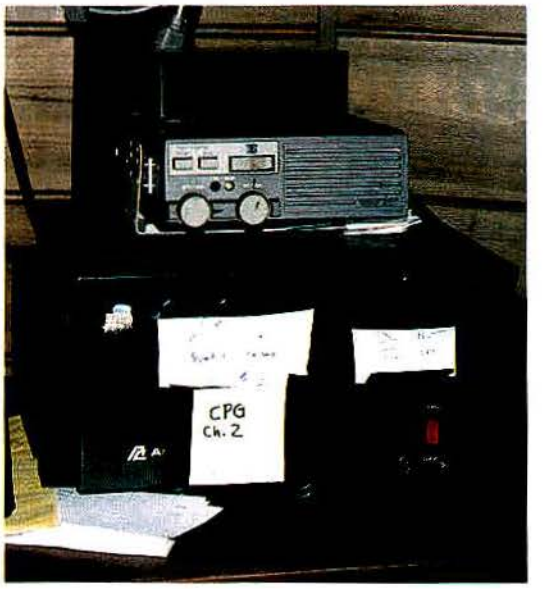
Hand-held radio batteries are purchased in bulk, with about one-third of the fleet rotated at a time. Aftermarket batteries and OEM batteries seem to give different results, based more on user charge habits than on specific system attributes. For example, most patrollers get more than four years of use out of the OEM batteries with the remainder split on life-span.

The resort hotel recently added small Motorola Spirit hand-held radios for use by the bell-and-service staff to supplement an in-house paging system.

Other ski facilities in the area use simplex radio systems to control lift equipment and to communicate with their ski patrollers. A classic remote base and multiple hand-held radios provide more than adequate coverage.

Because these facilities are down in town, local telephone service, with a cellphone backup, meets all the needs for emergency agency contact for these smaller businesses.

A small business today cannot forgo a modern radio communications system, whether it's a large trunked system or a less complex simplex system with remote base stations. Radios provide the key link for skier safety, facility operation and rescue work in the potentially dangerous world of recreational snow sports. ■




This Kenwood simplex two-way radio, atop its power supply, is part of a diverse collection of equipment used to support ski operations.

CIRCLE (61) ON FAST FACT CARD

# Powell succeeds Kennard as FCC chairman

Kennard

After overseeing three of the most explosive years in the history of the communications industry, Chairman William E. Kennard resigned from the Federal Communications Commission, effective Jan. 19, 2001.

Kennard, whose term would have ended June 30, 2001, served a three-year term that began and ended with historic events. He was welcomed into the position with the responsibility of continuing implementation of the Telecommunications Act of 1996, and he leaves the position after approving the $106 billion AOL-Time Warner merger.

In a letter to President Clinton, Kennard expressed his gratitude for the opportunity to serve as chairman.

"I feel very privileged that I was able to serve as chairman of the FCC at a time when communications technologies are so dramatically changing the way the American people live, work and learn," he wrote.

According to an FCC release, Kennard will serve as a senior fellow of the Aspen Institute Communications and Society Program in Washington for the next few months. He will be responsible for advising on leadership, communications policy and program activities and operations.

FCC Commissioner Michael K. Powell, an advocate of free markets and competition, has been designated by President George W. Bush to succeed Kennard as chairman of the commission. Kennard's departure and Powell's advancement leave a commissioner position open, which Bush will most likely fill with a Republican.

Shortly after Powell was named chairman, Commissioner Harold Furchtgott-Roth announced that he would not seek reappointment to a second term, leaving yet another Republican commissioner seat to be filled. His first term expired June 30, 2000, but he continued to serve pursuant to federal law that allows a commissioner to remain in office for as many as 18 months after the term expires or until a successor is named.

In a statement released Jan. 31, 2001, Furchtgott-Roth said he would continue to serve until a "mutually agreeable departure date is worked out with the administration."

Powell was nominated to membership on the commission by President Clinton in August 1997, and he has served as the FCC's defense commissioner, coordinating communications issues affecting national security emergency preparedness. He headed up the FCC's Y2K Task Force in 1999.

Early industry response to the appointment has been favorable, including approvals from Cellular Telecommunications & Internet Association President Tom Wheeler and Personal Communications Industry Association President Jay Kitchen.

"He knows the issues, he knows the new competitive marketplace, he knows how to lead," Wheeler said.

Kitchen remarked that "As a commissioner, [Powell] has supported an open marketplace free of burdensome regulations that will ultimately benefit consumers through increased competition and access to products and services."

For commentaries on Powell's succession, see "In the Public Interest" on page 10 and "Making Waves" on page 8.

CIRCLE (62) ON FAST FACT CARD

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## Com-Net celebrates one-year anniversary

For football fans, the Super Bowl represents the biggest sporting event of the year. For Com-Net Ericsson Critical Radio Systems, Lynchburg, VA, it played a large part in the company's first-year anniversary celebration.

One year after Com-Net Critical Communications, Pittsburgh, acquired the private radio systems unit of Ericsson, Stockholm, Sweden, on Jan. 26, the fledgling company marked the anniversary by announcing that law enforcement agencies at Super Bowl XXXV in Tampa, FL, would be using Com-Net Ericsson radios for security.

"While this first-year anniversary is certainly a significant day for us, it is also a reminder of all the people—customers, employees, and this community—who made this milestone possible," said Steve Savor, Com-Net's chief executive officer. "We are proud of our achievements and excited about the foundation they provide for future growth and service to the people of Lynchburg."

It has been an eventful year for the new company. Com-Net recently agreed to complete Florida's statewide public safety communications system, which the state will lease back from Com-Net. The two sides reached the agreement after the state decided to end its system build-out contract with Motorola.

## TX RX Systems signs contract with NYC

TX RX Systems, Angola, NY, won a contract worth more than $15 million to upgrade the communications equipment in New York City's subway system. The contract was awarded by E.A. Technologies/ Petrocelli, a New York City systems integrator selected as the prime contractor for the project by the NYC Transit Authority.

The project will take place in two phases over the next five years, and it will connect police and fire communications radios to the underground subway stations and 443 miles of connecting tunnels.


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CIRCLE (67) ON FAST FACT CARD

## Marketronics to distribute Securicor products in Latin America

Securicor Wireless, New York, entered into a sales and distribution agreement to expand its U.S. network to Latin America through Florida-based Marketronics.

Marketronics has established a foothold in the Latin American market with offices in Buenos Aires, Argentina; Sao Paulo, Brazil; Santiago, Chile and Mexico City.

Using Marketronics' dealer network, the joint effort will actively promote and distribute Securicor's full range of integrated, spectrum-efficient voice and data services and applications throughout the region.

"This partnership represents a significant milestone in expanding our company's footprint in Mexico and Latin America," said Robert J. Shiver, chairman of Securicor. "We could not have a more experienced, better-positioned partner for marketing our patented technology, systems and products to emerging wireless operators throughout this part of the world."

Marketronics general manager Francisco Noyola said, "The huge Latin American wireless market is just beginning to gather steam. We also believe we have selected the ideal partner in terms of product, systems and technology."

## Spectrum auction ends, earns $16.9 billion for taxpayers

The Cellular Telecommunications & Internet Association applauded the results of the FCC's re-auction of spectrum purchased by Nextwave, Hawthorne, NY, in 1995. The auction raised $16.9 billion.

"This is a $16 billion victory for taxpayers," said Tom Wheeler, president of CTIA. "We must thank Senator Judd Gregg and [FCC] Chairman Kennard for standing up to the special interests, ensuring that the licenses were auctioned and that tax payers received market value for their asset."

Nextwave had originally purchased the spectrum through auction in 1995 for $4.7 billion. After making a $500 million down payment, however, the company filed for bankruptcy. Last year, Nextwave and its creditors spent more than $1 million lobbying Congress and the FCC for a sweetheart deal, at one point offering $5.3 billion for the licenses. Congress and the commission denied the request and insisted that the licenses be put up for re-auction.

"This most recent auction demonstrated the value of spectrum in a spectrum-starved market," Wheeler said. "We need to lift the spectrum cap and provide more spectrum for 3G development. Today, we risk falling behind the rest of the world in the race for the new, new thing—the wireless Internet. Europe and Japan have each set aside up to twice the amount of spectrum as the United States for 3G technology and other wireless services."


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## VisionAir teams with Texas law enforcement

VisionAir, Wilmington, NC, signed a contract with the city of Grapevine, TX, to provide several of the company's software applications to Grapevine's public safety agencies.

The company's public safety suite of products includes Visioncad, Visionrms and Visionmobile.

In addition to Visionmobile and Inform, the new software system will provide agency employees with the ability to dispatch units from multiple departments and to submit incidents and arrest reports directly to the FBI or state crime information centers.

## Scanning...

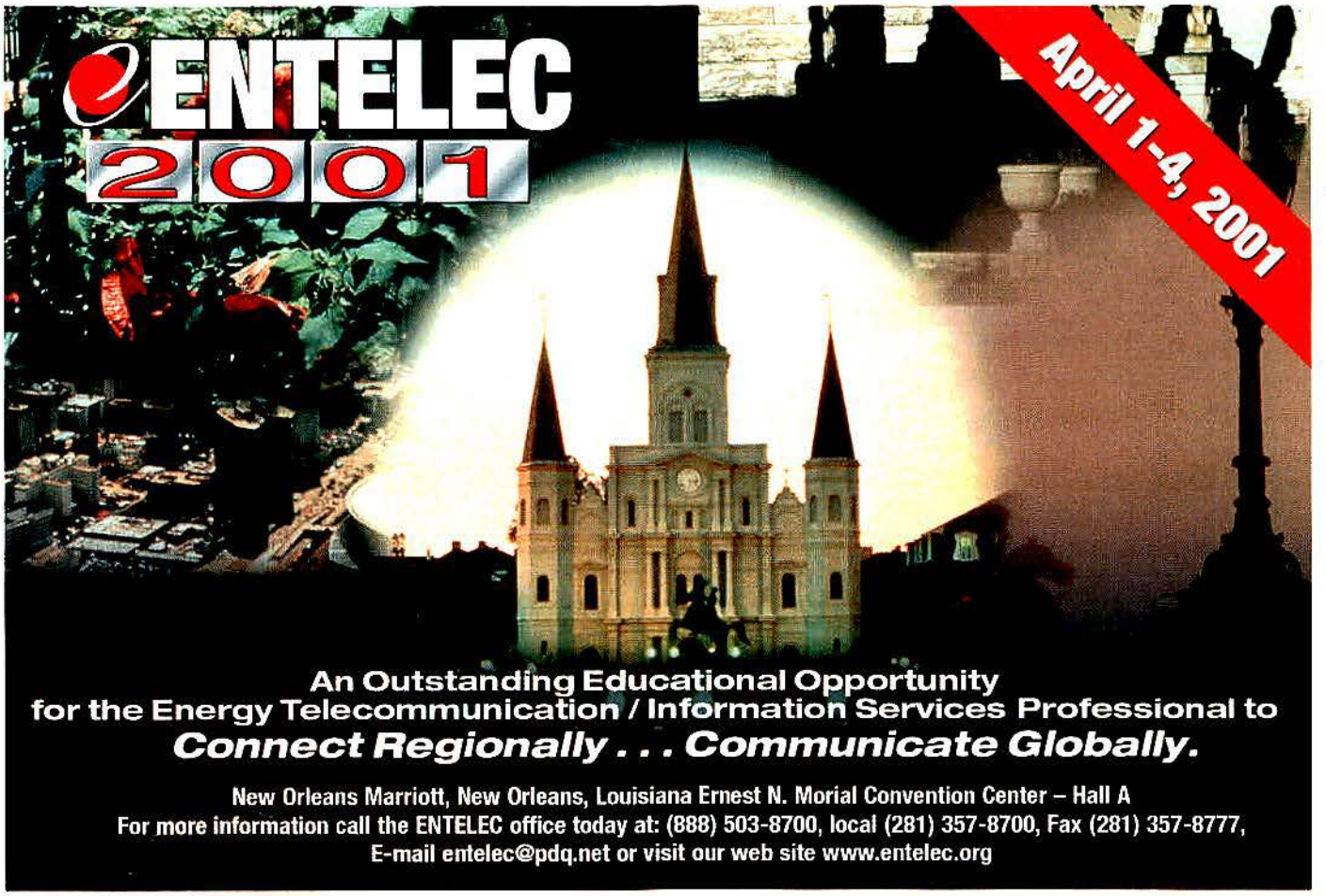
Illinois governor George H. Ryan announced the state's FIRST Program will provide $25 million for a new statewide police radio communications system to improve public safety. The FIRST grant to the Illinois state police will purchase new radio equipment that includes the Starcom21 wireless state radio system. The state will lease time on the new network to be constructed by Motorola, the vendor selected after a competitive bid.

The Kankakee County Emergency Telephone System Board met Dec. 27, 2000, and signed a contract with Motorola to install a new county-wide area radio network. The new $3.7 million system will establish a linked emergency radio system linking all police, fire, ambulance and other emergency providers throughout Kankakee County.

Sigem, Kanata, Canada, agreed to a deal with St. Louis County Cab of St. Louis and the Diamond Taxicab Association of Toronto for full orders of its newest mobile data terminal product, Eping Emerald, and the latest version of its Eping Enterprise fleet management software. The system uses GPS technology to enable fleet managers to automatically dispatch the closest vehicle to the caller.

VisionAir, Wilmington, NC, signed an $815,000 contract with the Lewisville (TX) Police Department to supply the agency with Visioncad, Visionrms, Visionjail, Visionfire and Visionmobile software packages. The applications are part of the company's WindowsNT-based public safety suite of products.

Northwood Technologies, Nepean, Ontario, and Siradel S.A. agreed to make their respective networking planning technologies interoperable. As a result, the Northwood Decibel Planner wireless network design software will be fully compatible with the Siradel Volcano propagation software.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## Business radio offers voice scrambling

**Tekk** has upgraded its NT-8 and NT-9 business radios to include new software features. The radios are 5W, 16-channel portable radios that have been enhanced to new RF designs. Upgraded to NT-80 and NT-90, the radios now include phase-inversion voice scrambling for low-priority secure conversations in addition to their current features. The NT-90 is currently shipping in place of NT-9, and the NT-80 will start shipping in April.

WWW.TEKKINC.COM OR 800-521-8355

## Portable provides LTR, conventional trunking

The SP-150U from **Topaz3** is a portable that operates in LTR or conventional format and provides users with 16 combined trunked systems and groups and 20 trunked repeater channels per system, along with 16 conventional channels. The radio offers value-added security features such as password protection, which prevents unauthorized users from reprogramming the radio; and embedded messaging to aid in identifying the radio's legal owner if the unit is lost or stolen. Other benefits include user scan list editing, programmable audio levels and flash programming

WWW.TOPAZ3.COM OR 800-821-7848

## Radios feature Passport option

**Kenwood Communications'** 80 series of portables features the Passport option. The radios are available in 800MHz, 900MHz and 450MHz conventional, LTR and Passport operation models. The radios offer the ability to do field upgrades on existing 80 series radios to incorporate the Passport option, unique roam features and over-the-air enable and disable of individual subscriber units, preventing loss of revenue. Passport networking technology allows for wide-area network calling with automatic roaming, auto-registration, unique radio ideas and many other system management features designed for private and public networks.

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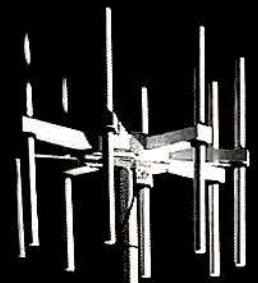

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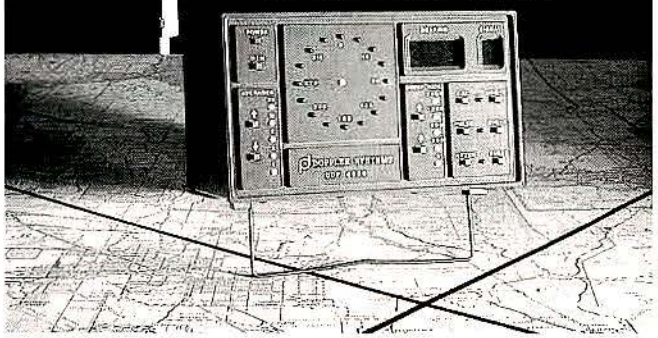

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## Analog trunked radio operates in 3 modes

The 7780 800MHz portable radio from **EFJohnson** delivers 3W of RF power. It is a multimode radio that can be simultaneously programmed with as many as 256 channels in conventional analog wide, conventional analog narrow, trunked Smartnet II or trunked Smartzone. The radio features an eight-character LCD plus 14 status annunciators, zone selection, channel selection, home zone, mute alert tones, radio-wide scanning, priority monitor scanning and conventional scanning.

WWW.EFJOHNSON.COM OR 800-328-6222

## Small portables fit in shirt pocket

The Jobcom JMX 4-series portable radios from **Ritron** are VHF and UHF radios that feature four-channel capability for multiple work groups and 1.5W, 2W and 3W of power output. The portables weigh 11.5 ounces and stand 4.75 inches tall. The radios fit in a shirt pocket or on a belt. They are weather-resistant and impact-resistant. A range of two to three miles (line-of-sight) makes them suitable for use in factories, hotels, schools, hospitals and construction sites. They are programmable to any frequency within the VHF and UHF band, as well as 12 PTT user-programmable color dot/star frequencies. They include 50 built-in user-programmable interference eliminator codes and PC-programmable narrow and wideband selections.

WWW.RITRON.COM OR 800-872-1872

## Radio offers lightweight design

**Relm Wireless'** Aurora has a compact, lightweight design. It is a Flex-mode synthesized FM portable radio with a frequency range of 136MHz–174MHz and offers 16- or 240-channel capability. It has soft function keys and is clonable to previous models. It also offers an emergency button.

WWW.RELM.COM OR 800-648-0947

CIRCLE (63) ON FAST FACT CARD

Product Encore

Of the new products in the July 2000 issue, this one generated the biggest reader response. For more information on this product, log on to **www.motorola.com**.

## Earpiece has automatic squelch

**Motorola's** completely discreet earpiece is designed for use with Motorola two-way radios and surveillance kits by police officers, public safety officials and security operatives. Users can transmit communications through the wireless earpiece via an inductive neckloop connected to a Motorola two- or three-wire surveillance kit. Its small size is designed to enable the user to monitor radio transmissions without compromising undercover integrity. The earpiece offers a range of audio functions including automatic squelch, automatic gain control and noise filtering. Average battery life is 100 hours, and the earpiece includes an end-of-life circuit that generates a warning signal when the battery needs changing.

WWW.MOTOROLA.COM

## Radio modem offers error correction

The RF9600 from **RF Neulink** is a radio modem that operates on the new unlicensed MURS frequencies. The modem is capable of 9600 baud, has error correction, robust reliability and comes pre-programmed with all five frequencies. Each station can have its own ID code to ensure that it responds to commands. Units will work with many commercial weather stations.

WWW.RFNEULINK.COM OR 800-233-1728

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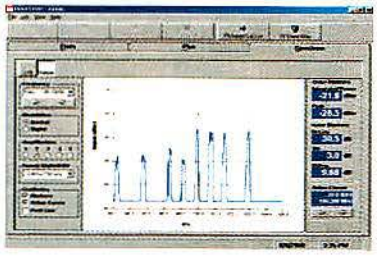
## Combiner offers weather-tight construction

Model 350-BD-FFE-2 from **Bird Component Products** is a weather-tight, two-way divider and combiner. The unit offers a frequency range of 460MHz–960MHz, 350W power rating into matched loads and 150W into mismatch conditions. It also offers VSWR input 1.3:1 maximum and output 1.2:1 maximum. Specifications include insertion loss <0.4dB typical, <5.5dB maximum. Isolation is 20dB minimum, and phase balance is 2° maximum.

WWW.BIRDFLA.COM
OR 727-547-8826

## Software documents digital and analog signals

The S5007GPS RF field strength mapping system from **Z Technology** is a Windows-based system that generates signal strength maps of a service area and takes steps to correct or improve geographical coverage. When used with a calibrated antenna, the system offers comprehensive facility for NIST-traceable RF power measurement and documentation of digital or analog signal coverage.



WWW.ZTECHNOLOGY.COM OR 888-613-9832

## Hands-free kit works with IDEN radios

**Klein Electronics'** hands-free kit is designed for Motorola IDEN telecom products. The design of the earpieces with in-line microphone requires no adapter. Retail packaged, the kit is made for the i500, i700, i1000 and i2000 series phones.

WWW.KLEINELECTRONICS.COM

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| Motorola Test Equipment | 7 | 8 | 800-505-TEST |
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| Thunder Eagle | 80 | 70 | 703-242-0122 |
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| W & W Manufacturing | 9 | 9 | 800-221-0732 |
| Zetron Inc. | 23 | 19 | 425-820-6363 |

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WWW.ASTRONANTENNAS.COM

## Headset offers an M-1/dc-amplified mic

The model H3340 headset/microphone from **David Clark** is designed to be worn with a safety cap, and it offers an M-1/dc amplified (nominal 100V) microphone. The boom has three adjustment points for perfect microphone placement. It can be rotated to position the microphone on the left or right side. The nominal 300V earphones are wired in series. The four-conductor cord is 28" nominal in length, and the plug is 2P-1643.

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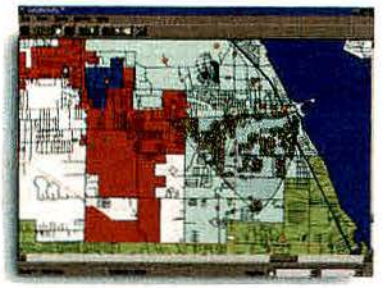

The Communicator from **Dialogic Communications** is an interactive notification technology program for business, industry and government operations. Scaleable to 72 on-site telephone lines, the system ensures immediate, two-way communications with response teams. It offers total automation of all emergency and non-emergency notification procedures with immediate verification.

WWW.DCCUSA.COM OR 800-723-3207

## Analyzer covers 100kHz–3GHz

The MS2711A is a fully functional handheld spectrum analyzer from **Anritsu** that offers a rugged, lightweight, battery-operated design. Weighing four pounds and powered by a NiMH battery, the spectrum analyzer covers the 100kHz–3GHz frequency range. It is designed for testing of cellular, data, paging, PCS, satellite, SMR, wireless Internet and WLAN/WPBX systems. A save-setup feature allows as many as 10 test setups to be stored in the spectrum analyzer's nonvolatile memory. All results are shown on a large, high-resolution LCD that makes viewing easy under a variety of lighting conditions.

WWW.US.ANRITSU.COM OR 800-267-4878

## Generator allows channel gating

Model 555 is a digital delay/pulse generator from **Berkeley Nucleonics** that offers multichannel 1ns-resolution timing, delaying, gating, pulsing and syncing functions. Each channel offers delays and widths, so the two-channel unit offers the same delay and width functionality of four-channel units. It is available in two-, four- and eight-channel configurations. Pulses are synchronized to a common or internal trigger. Channels may be gated, and gate enabling is selectable on a per-channel basis.

WWW.BERKELEYNUCLEONICS.COM OR 415-453-9955

## Mounted display enables navigation of drive-test software

The N3419A from **Agilent Technologies** is a vehicle-mounted display system that allows for real-time troubleshooting while using the company's wireless network optimization tools. It consists of a bright display, rugged and adjustable pedestal mounting, and a custom keypad. The system enables wireless network technicians and optimization engineers to easily navigate drive-test software. The keypad enables users to perform essential functions, such as starting and stopping calls, switching between measurement windows and recording measurements with one keystroke.

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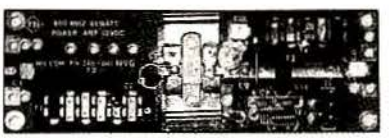

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## Battery monitor uses single-cell voltage

The Intelligent Monitoring System from **GNB Industrial Power** is a stand-alone system that continuously assesses a battery's ability to provide power to critical applications. The IMS actively notifies the user when the battery requires service or replacement, and it predicts the remaining standby time of a battery during a discharge. As a result, it allows the user to intelligently dispatch field generators and shed unnecessary battery loads to critical sites before power is lost. The system uses single-cell voltage and impedance testing in conjunction with string current analysis to quickly pinpoint a problem.

WWW.GNB.COM

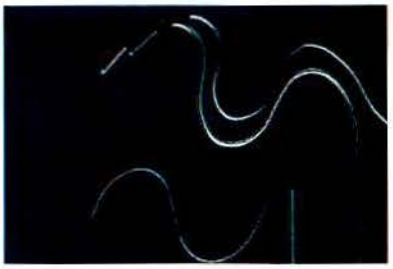
## Laptop reduces heat absorption by 30%

The White Rocky from **Amrel** is a special version of the Rocky II+ laptop developed for the public safety sector. The computer is encapsulated with a white coating that reduces heat absorption from direct sunlight by as much as 30%. It has been certified to MIL-STD 810E, MIL-STD 461D and IP54 for ruggedization, and it is equipped with a Pentium III 500MHz CPU. Its open-architecture design allows

for easy system upgrading, device integration and field servicing.

800-882-6735

## Microwave cables offer 50Ω impedance



The Utiform family of tin-dipped microwave cables from **Micro-Coax** has a higher temperature rating than semi-rigid cables and an equivalent bend radius. The cables are 100% shielded and offer impedance of 50Ω over a wide dc–95GHz frequency range. Capacitance is either 27pf/ft. or 29pf/ft., depending on the cable. Signal delay is either 1.45ns/ft or 1.32ns/ft, also depending on the cable.

WWW.MICRO-COAX.COM OR 800-223-2629

## Adapter kit turns portables into mobiles

The vehicular adapter kit from **Motorola** turns the company's portable HT750 and HT1250 two-way radios into mobile units when the user is traveling between job sites or in a public safety or security situation where the user is moving throughout the coverage area. A hand-held microphone is provided along with a battery spacer, an RF switch adapter and an installation kit. The adapter also has the added audio power needed for an external speaker. The unit maintains the portable radios' original transmission and reception characteristics.

WWW.MOTOROLA.COM

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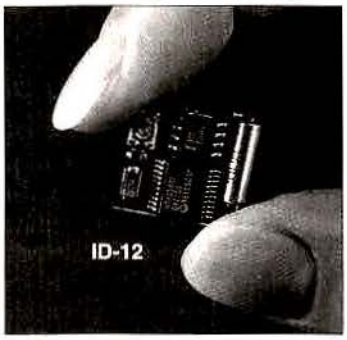


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Control Signal's ID-12/1201 is an economical **MDC-1200** ANI system. The ID-12 encoder works in all radios and fits in virtually all handhelds and mobiles. The ID-1201 decodes any **MDC-1200** ANI signal, has a large LED display, a printer port and an RS232 port.

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**20–22: Wireless,** sponsored by the Cellular Telecommunications & Internet Association, Las Vegas. Contact: 202-785-2842 or **www.wow-com.com.**

**27: Small Business in Telecommunications Jam Session,** Alexis Park Hotel, Las Vegas. Contact: 202-347-4511 or **www.sbthome.org.**

**28–30: International Wireless Communications Expo,** sponsored by *Mobile Radio Technology*, Las Vegas Convention Center, Las Vegas. Contact: Web site **iwceconexpo.com.**

**29: Simulcast Forum 2001,** sponsored by Simulcast Solutions, Hilton Hotel, Las Vegas. Contact: Ed O'Connor at 716-223-4927 or **www.simulcastsolutions.com/calendar.htm.**

**April**

**1–4: ENTELEC,** sponsored by ENTELEC, New Orleans. Contact: 281-357-8700 or Web site **www.entelec.org.**

**24–27: APCO North Central Regional Conference,** sponsored by the Association of Public Safety Communications Officials–International, Radisson Hotel, Bismark, ND. Contact: Rick Hessinger, 701-328-8153.

**May**

**6–9: Spring Vehicular Technology Conference,** sponsored by the IEEE Vehicular Technology Society, David Intercontinental Hotel, Tel Aviv, Israel. Contact: 972-3-6133340 or **congress.co.il/ieee_news/index1.html.**

**13–17: APCO East Coast Regional Conference,** sponsored by the Association of Public Safety Officials–International, Lancaster Host Resort, Lancaster, PA. Contact: Jay Groce III, 610-344-5084.

**16–18: PCIA Tower and Site Management Conference,** sponsored by the Personal Communications Industry Association, Doral Golf Resort and Spa, Miami. Contact: 703-739-0300.

**21–24: Telecommunications Resellers Association Spring Conference and Exhibition,** sponsored by TRA, Adam's Mark Hotel, Dallas. Contact: **www.tra.org.**

**June**

**3–7: Supercomm,** sponsored by TIA and USTA, Georgia World Congress Center, Atlanta. Contact: 800-278-7372.

**24–27: UTC Telecom,** sponsored by UTC, the United Telecom Council, Midwest Express Center, Milwaukee. Contact: 202-857-1881 or **www.utc.org.**

**24–28: NENA,** sponsored by the National Emergency Number Association, Orlando, FL. Contact: Web site **www.nena9-1-1.org.**


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## Corrections

In the December 2000 issue, SmarTrunk Systems should have been listed under the category "Trunked Radio Systems." SmarTrunk's address should also have been 28301 Industrial Blvd., Suite K & L, Hayward, CA 94545.

In the January issue, Avtec's Web address was listed incorrectly. It is **www.avtecinc.com**.

In the February issue, TX RX Systems'paging signal booster was labeled incorrectly. The model number is 60-96-00400-G1.

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| 50 | Motorola Starplex Channel Modems MLN6287 | $150ea |
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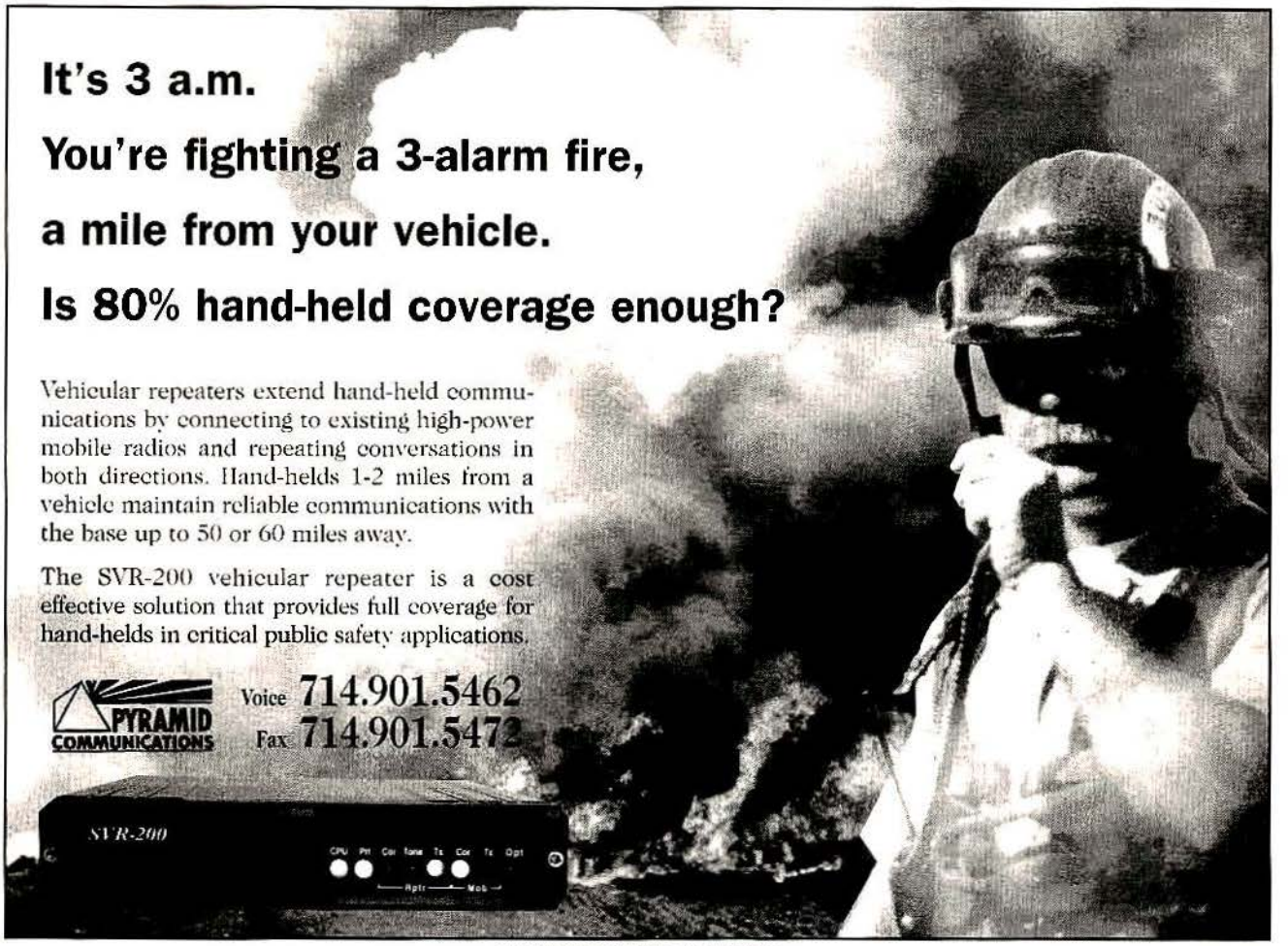


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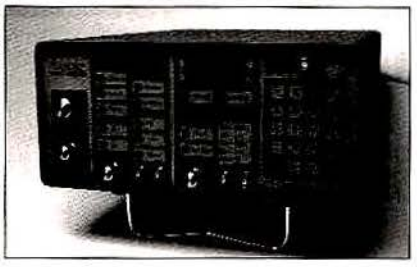

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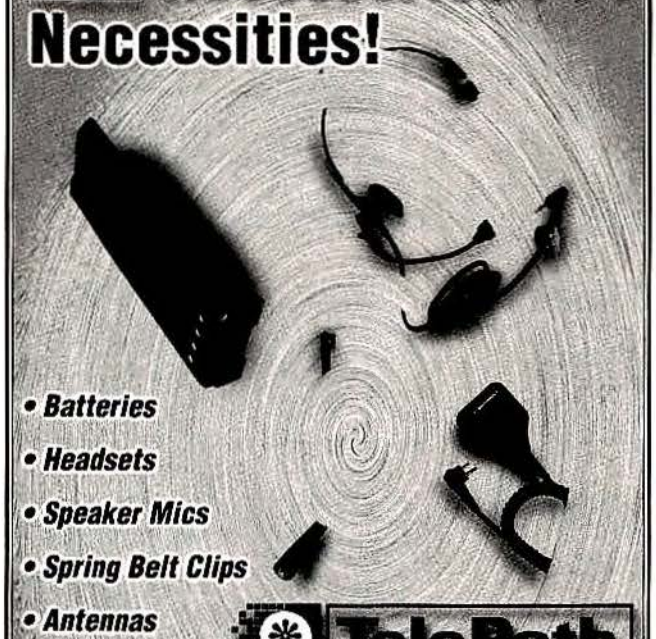

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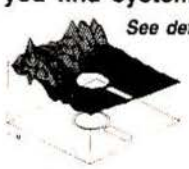

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**From Harold Hurtt, chief of police, Phoenix**

If police officers were asked to rank the importance of the tools we provide them to do their jobs, a functional police radio would be at or near the top of most lists. Our police radios function as lifelines for our officers and the public we are sworn to protect.

The 800MHz spectrum that my department and several others have converted to has, unfortunately, been seriously compromised by commercial carrier interference, the largest being Nextel. The City of Phoenix has spent nearly $500,000 on additional infrastructure and other improvements without regaining an acceptable level of performance.

Due to the continuing 800MHz interference problems and our need to obtain additional bandwidth for future applications, we have been anxiously awaiting the availability of the 700MHz spectrum that has been allocated for public safety. We did not anticipate interference being a problem in the 700MHz spectrum because the Balanced Budget Act of 1997 and the accompanying conference report clearly state that "public safety service licensees will operate free of interference from any new commercial licensee."

Recent engineering studies indicate that the emission protection rules currently established by the FCC are inadequate to protect public safety users from commercial carrier interference. The FCC standards established will not be sufficient to protect public safety from third- and fourth-generation commercial digital technologies, including time-division duplex (TDD) applications. Current FCC plans call for auctioning the 700MHz spectrum to commercial services on March 6, 2001.

The National League of Cities' Local State Government Advisory Committee (LSGAC) has summarized the 700MHz issue as follows:

"With the greater and accelerating use of spectrum it is absolutely essential that the 700MHz portion of the spectrum that has been set aside specifically for public safety uses have its complete functionality protected from the beginning. Attempting to fix problems after they occur will impose needless costs on the public and private sectors for litigation and less-than satisfactory retrofits. Public safety needs deserve the highest possible priorities from the commission."

The LSGAC has made the following recommendations:

1. The FCC should remove the TDD digital transmitters from the commercial (CMRS) band adjacent to public safety base station receivers.
2. The out-of-band-emission standard should be reduced from −46 dBm to a lower value of −80 dBm. Trapping noise before it is transmitted benefits all users by keeping the "noise floor" lower in this spectrum.

Please join the City of Phoenix, the Phoenix Police Department and myself in supporting the LSGAC recommendations. Support should be expressed by calling your elected representatives in Washington and by writing the FCC. Since the FCC's rulemaking process for the 700MHz spectrum seems to have run its course, we believe it will take an expression of concern from Congress to get anything changed. We believe it will also be valuable to let the FCC know that we are dealing with an issue of extreme concern to public safety. Please expedite your calls and letters. We must modify the FCC's current position on the 700 spectrum prior to the auction on March 6, 2001.

In my many years in law enforcement, I cannot recall a single issue with greater impact on our ability to do our job. Please lend your support!

Write to:

The Honorable Michael Powell, Chairman
Federal Communications Commission
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*Editor's note: On Jan. 31, the FCC acted to postpone the auction that Chief Hurtt mentions until Sept. 12, 2001. Related information appears on page 20.*

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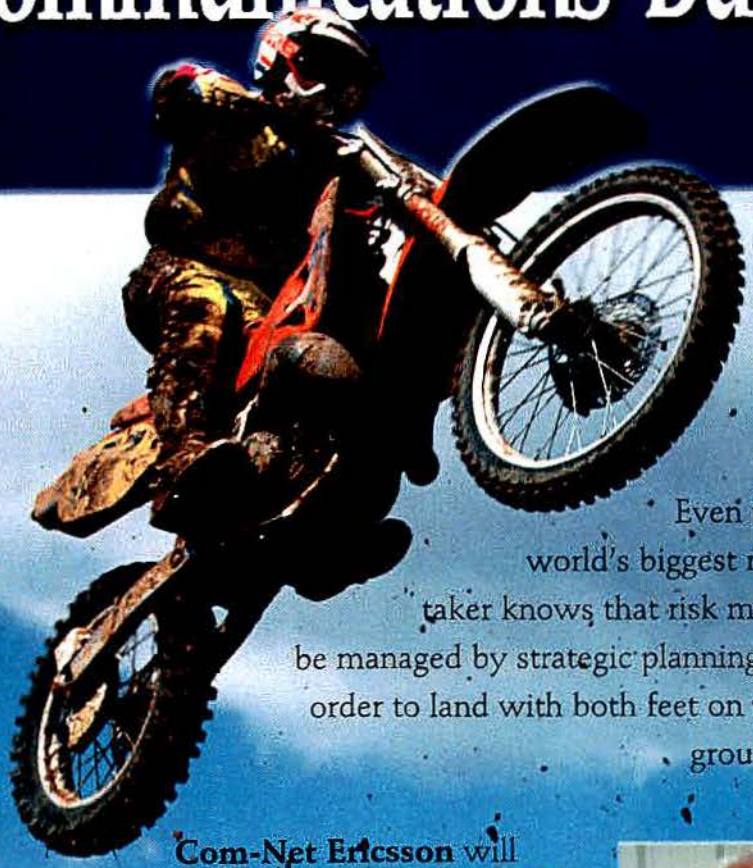

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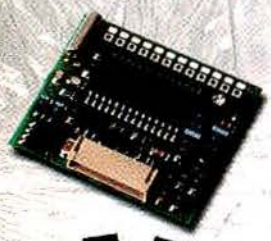

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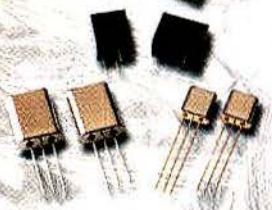

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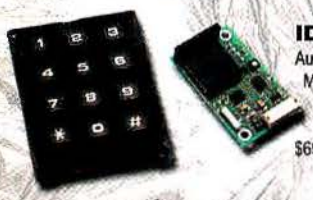

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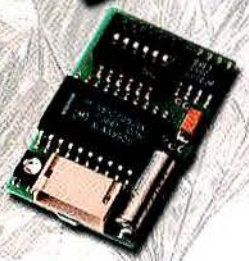

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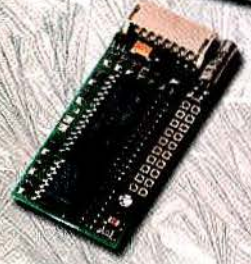

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